EXHIBIT A

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(12) **United States Patent**
Dalebout et al.

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(54) **STRENGTH TRAINING APPARATUS**

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(Continued)

(58) **Field of Classification Search**
CPC A63B 21/225; A63B 24/0087; A63B 24/0062; A63B 21/151; A63B 21/4047;
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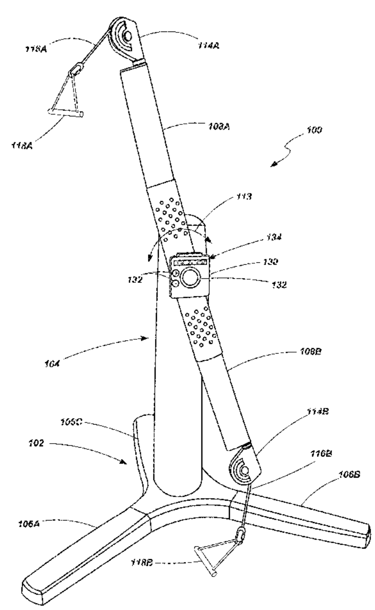
(57) **ABSTRACT**

Embodiments of a strength training apparatus and related methods are provided. In one embodiment, a strength training apparatus may include a tower, a first arm and a second arm each pivotally coupled with the tower and each being configured to be selectively positionable independent of each other at multiple angles relative to each other, a first pulley coupled to an end of the first arm, a first cable extending through the first arm and the first pulley, a second pulley coupled to an end of the second arm, a second cable extending through the second arm and the second pulley, a magnetic mechanism coupled to the first cable and the second cable and configured to provide multiple levels of resistance to a user pulling on the first cable and/or the second cable, and a control panel located on the tower.

20 Claims, 7 Drawing Sheets



Related U.S. Application Data

continuation of application No. 15/019,088, filed on Feb. 9, 2016, now Pat. No. 9,616,276, which is a continuation of application No. 14/213,793, filed on Mar. 14, 2014, now Pat. No. 9,254,409.

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(58) **Field of Classification Search**

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See application file for complete search history.

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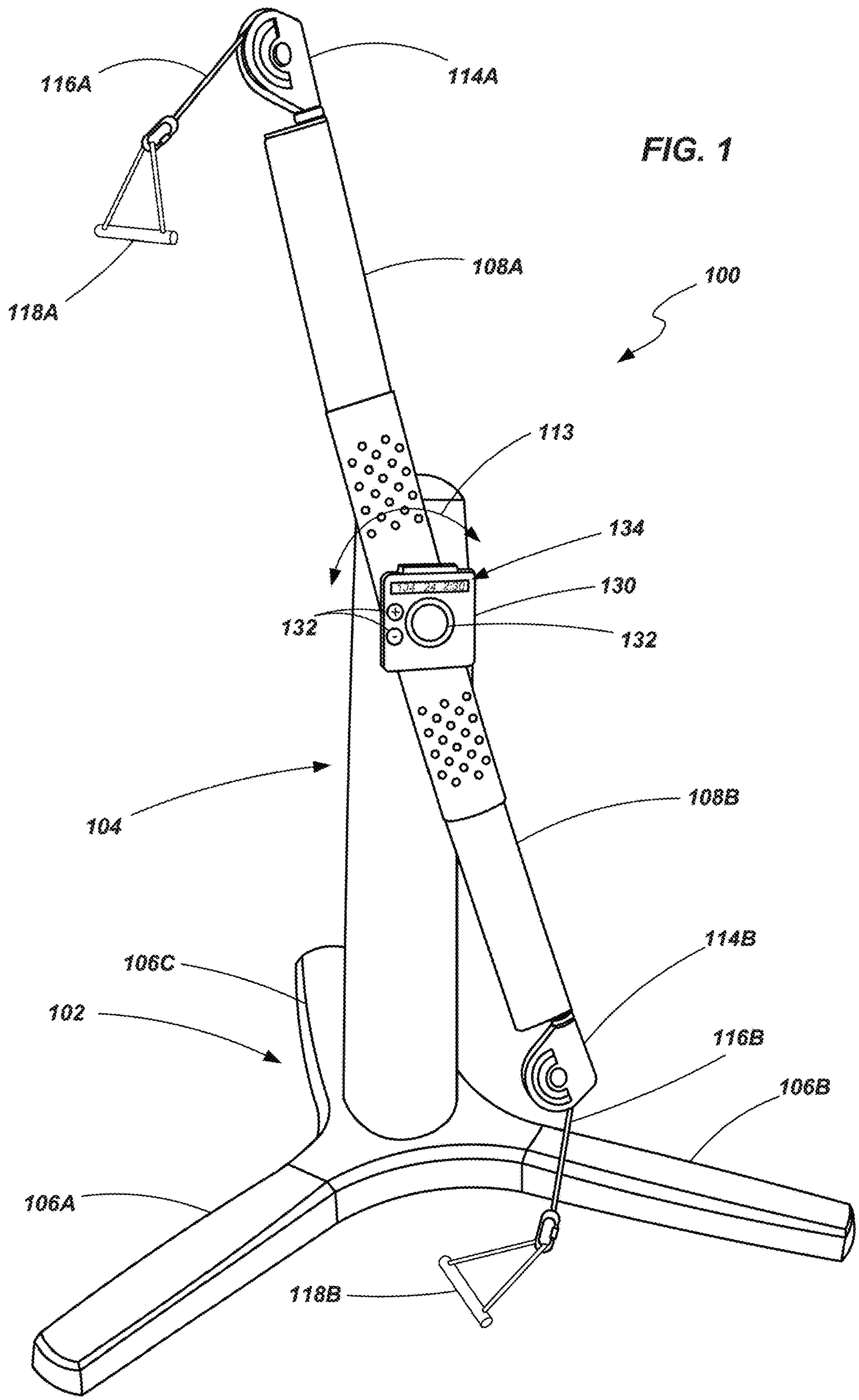
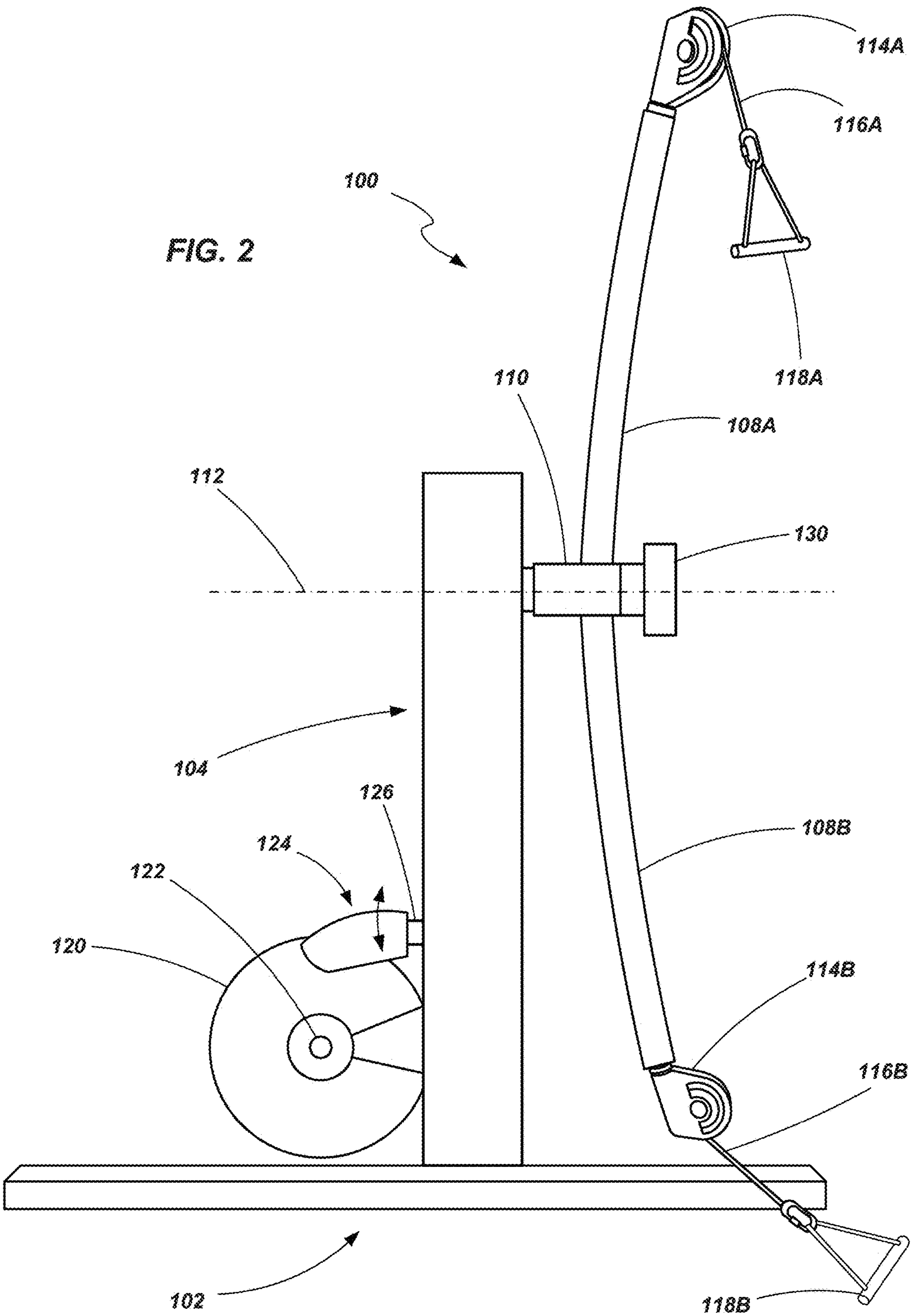
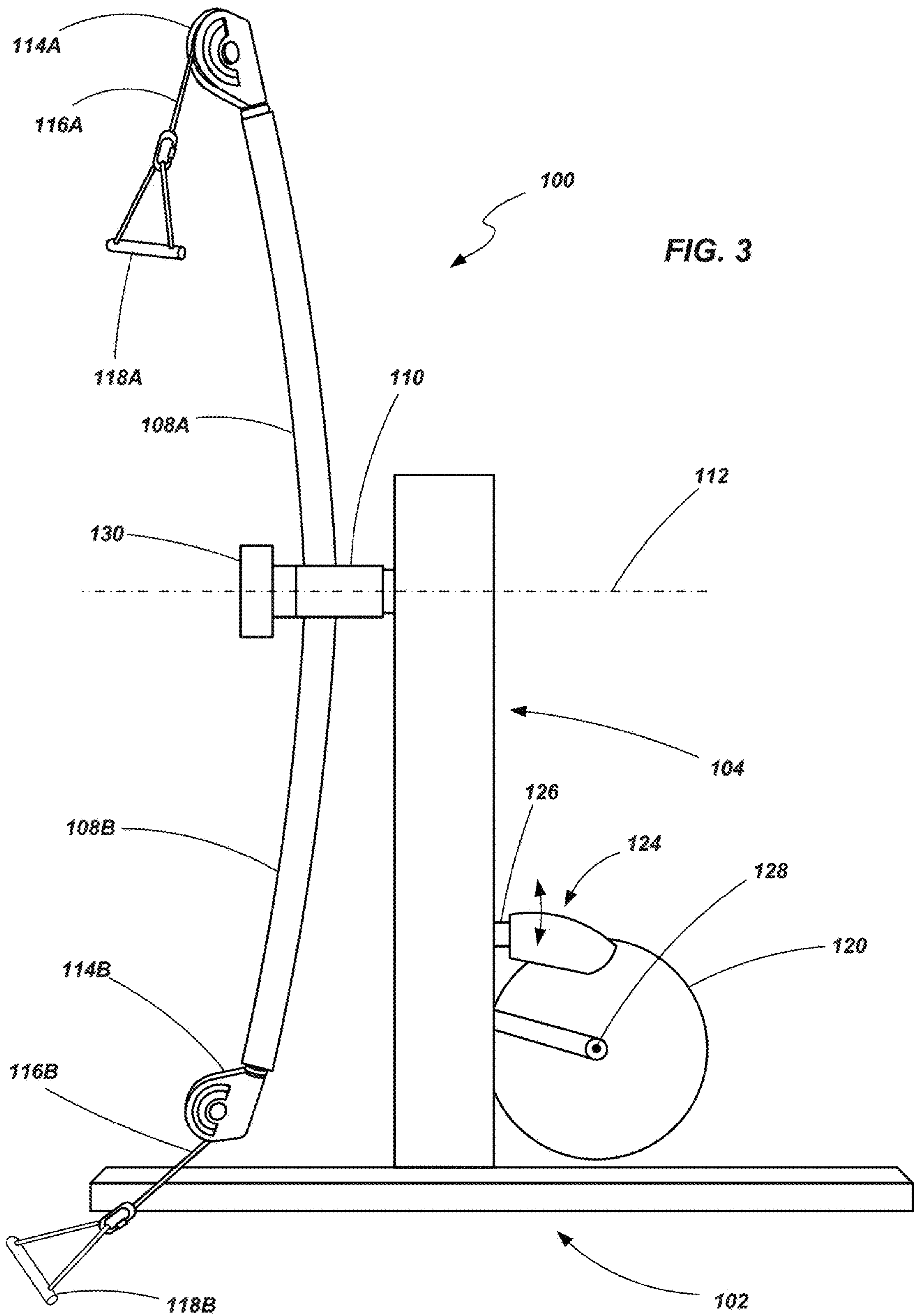

116A
114A
118A
108A
100
113
134
130
132
132
104
108B
114B
106C
102
116B
106B
106A
118B

FIG. 1

FIG. 2



114A
116A
100
118A
110
108A
112
130
104
126
108B
124
122
120
114B
116B
102
118B


114A
116A
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108A
112
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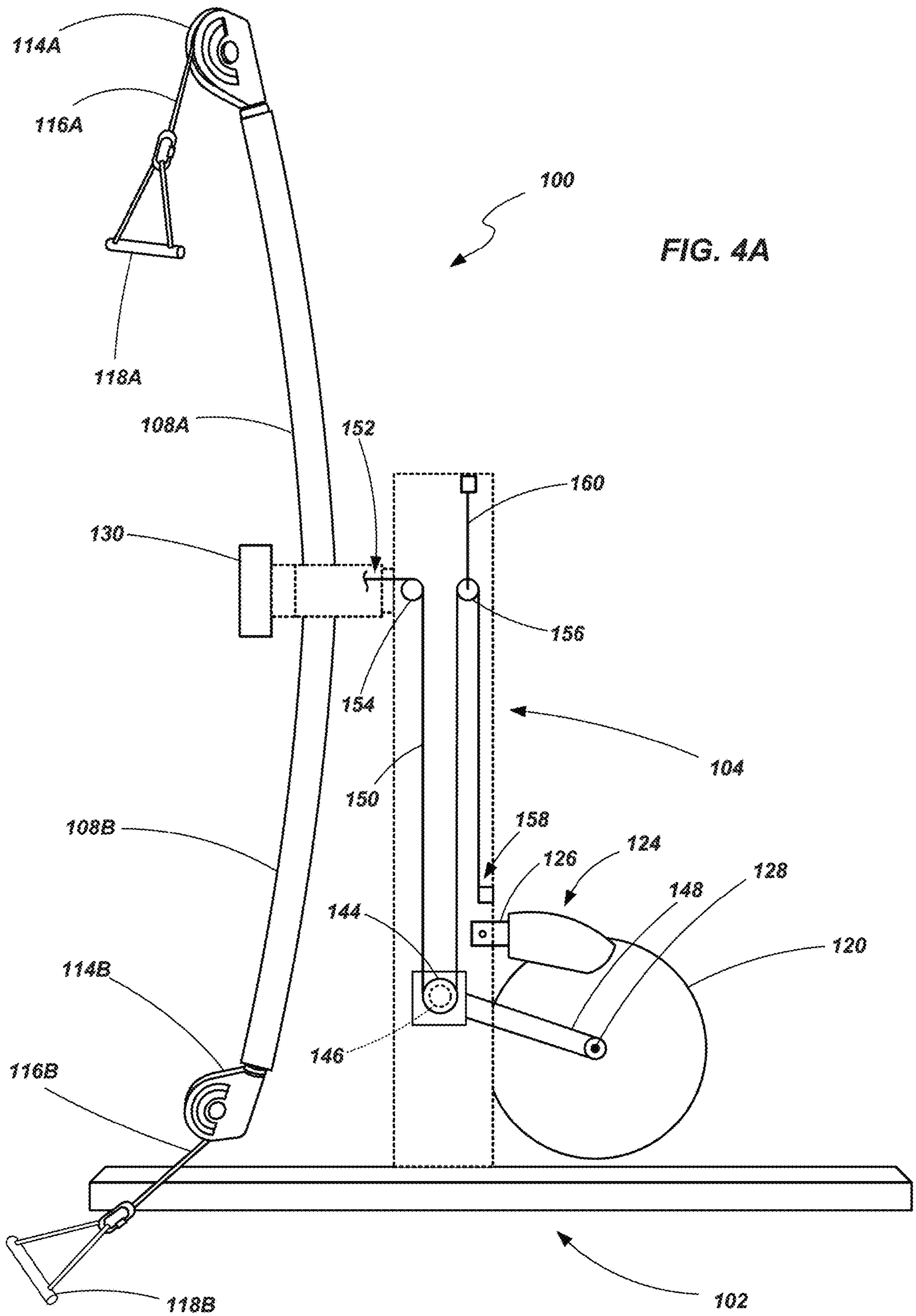
104
126
108B
124
128
120
114B
116B
118B
102

FIG. 3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116A
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118A
108A
152
160
130
156
154
104
150
158
124
108B
126
128
148
144
120
114B
146
116B
102
118B

FIG. 4A

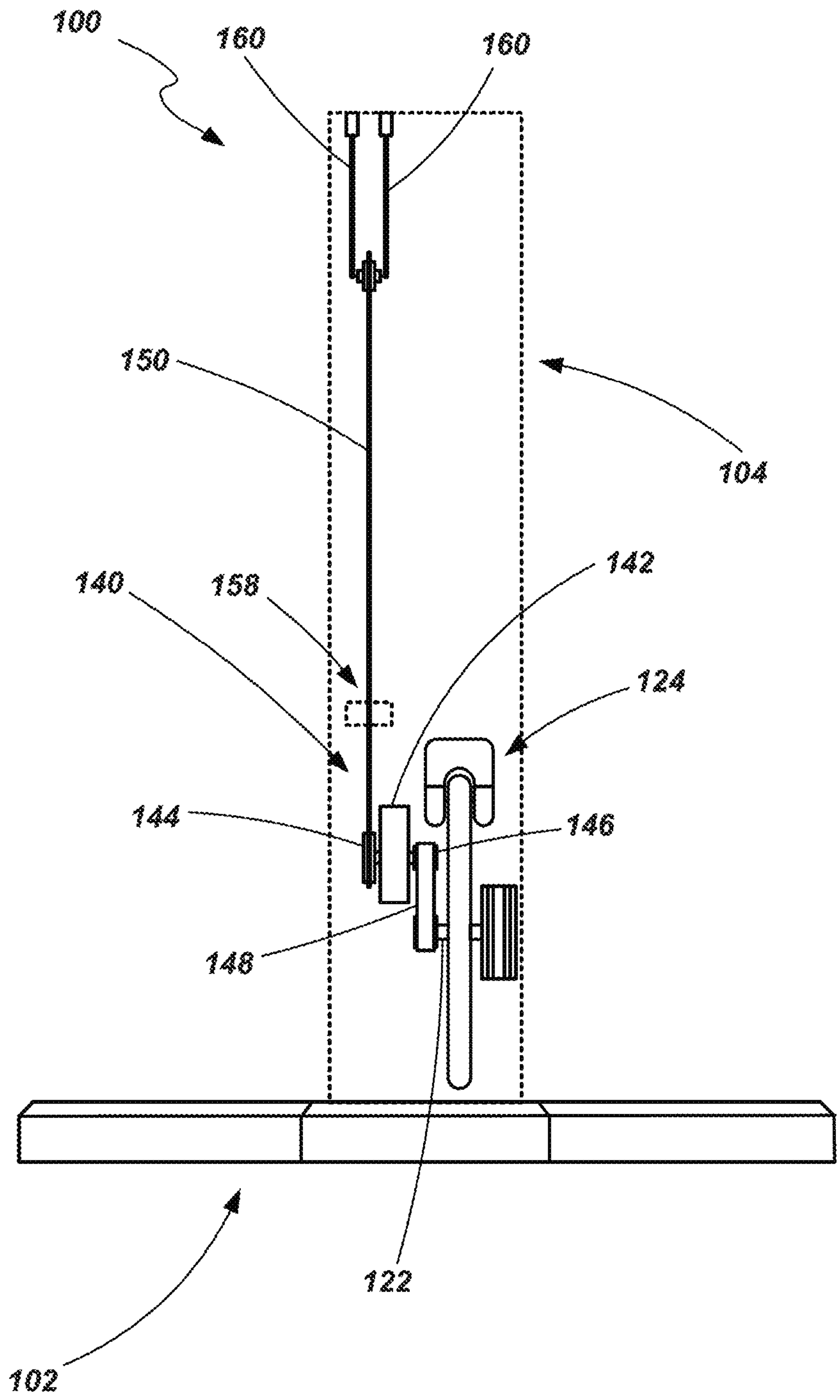
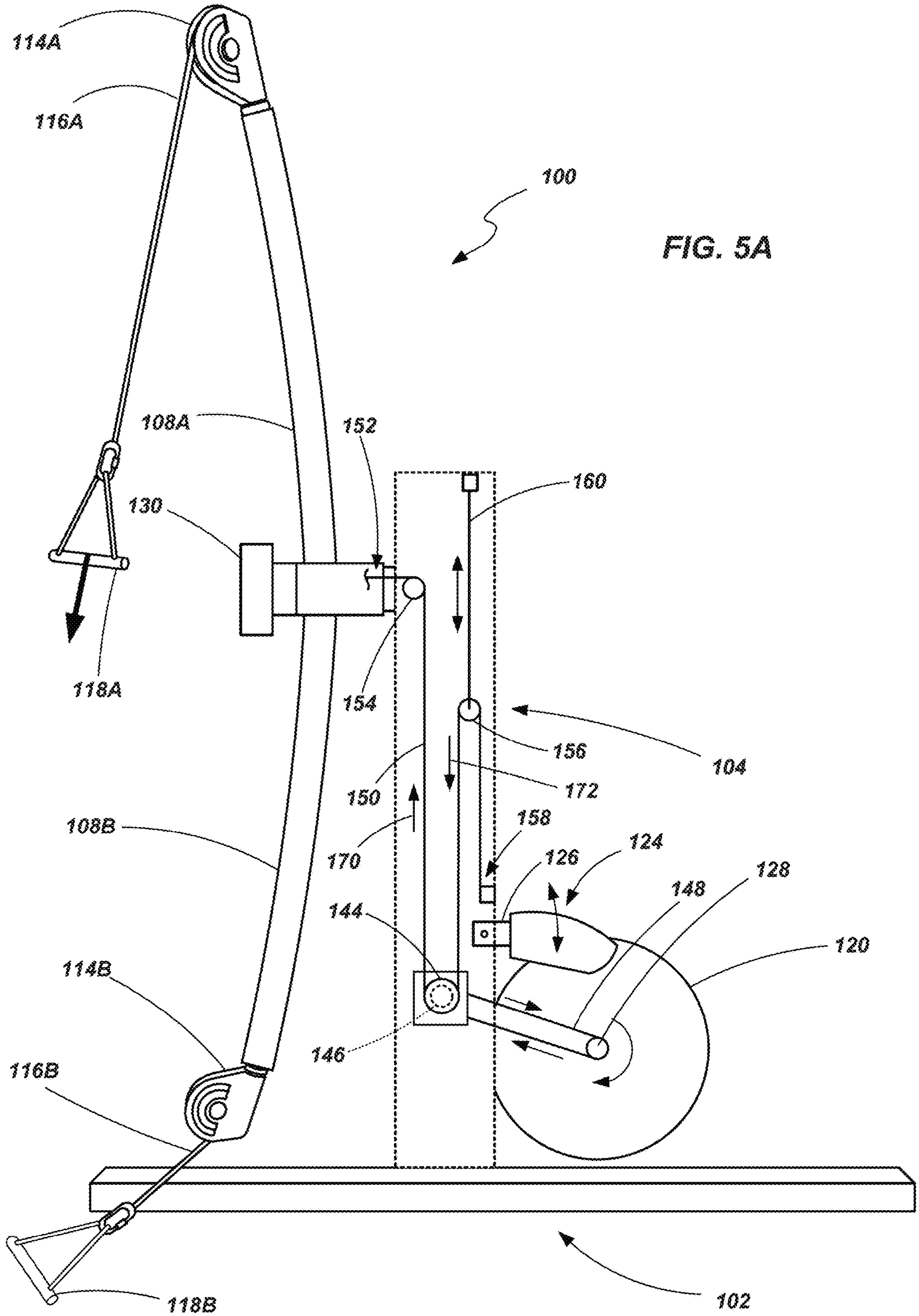


FIG. 4B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116A
100
108A
152
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130
118A
154
156
104
150
172
108B
170
158
124
126
128
148
144
120
114B
146
116B
118B
102

FIG. 5A

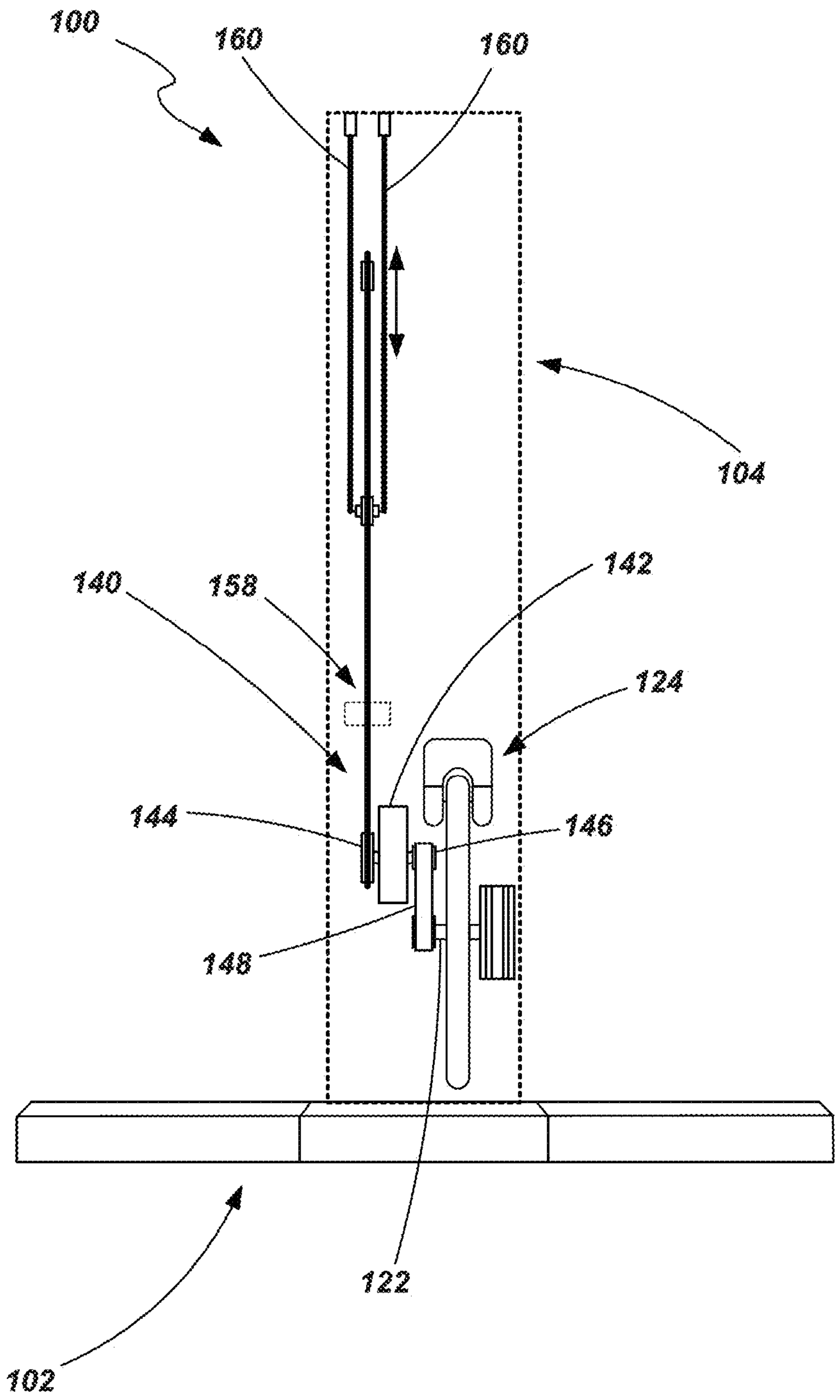

FIG. 5B

STRENGTH TRAINING APPARATUS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 15/472,954, filed on Mar. 29, 2017, now U.S. Pat. No. 10,279,212, which is a continuation of U.S. application Ser. No. 15/019,088, filed on Feb. 9, 2016, now U.S. Pat. No. 9,616,276, which is a continuation of U.S. application Ser. No. 14/213,793, filed on Mar. 14, 2014, now U.S. Pat. No. 9,254,409, which claims priority to U.S. Provisional Patent Application No. 61/786,007, filed on Mar. 14, 2013. Each of the aforementioned applications is incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates to exercise equipment. More particularly, the present disclosure relates to strength training equipment and to related methods.

BACKGROUND

While there are numerous exercise activities that one may participate in, exercise may be broadly broken into the categories of aerobic exercise and anaerobic exercise. Aerobic exercise generally refers to activities that substantially increase the heart rate and respiration of the exerciser for an extended period of time. This type of exercise is generally directed to enhancing cardiovascular performance. Such exercise usually includes low or moderate resistance to the movement of the individual. For example, aerobic exercise includes activities such as walking, running, jogging, swimming or bicycling for extended distances and extended periods of time.

Anaerobic exercise generally refers to exercise that strengthens skeletal muscles and usually involves the flexing or contraction of targeted muscles through significant exertion during a relatively short period of time and/or through a relatively small number of repetitions. For example, anaerobic exercise includes activities such as weight training, push-ups, sit-ups, pull-ups or a series of short sprints.

When exercising at home or in a gym, aerobic and anaerobic exercise usually involves the use of different types of equipment. For example, aerobic exercise usually involves equipment such as treadmills, ellipticals and bicycles (traditional and stationary) while anaerobic exercise often involves the use of free weights, weight stacks, or other cable and pulley resistance-type systems.

Often, individuals will plan their work-out routines to include both aerobic and anaerobic activities. For example, a person may do anaerobic exercises (e.g., weight lifting and other strength training exercises) on two or three days of the week while doing aerobic exercising (e.g., running, bicycling) on the remaining days of the week. In other instances, an individual may do both aerobic and anaerobic activities during the same day.

One of the difficulties in integrating both aerobic and anaerobic activities is the ability of an individual to efficiently and effectively track their progress. For example, many individuals use aerobic exercise equipment such as a treadmill or an elliptical machine to automatically track the calories that they've burned while using such equipment. However, it is more difficult to track or calculate such information when doing strength training exercises.

A couple of examples of equipment that has tried to combine aerobic exercising with anaerobic exercising are described in U.S. Pat. No. 5,527,245 to Dalebout et al. and U.S. Pat. No. 7,740,563 to Dalebout et al. These patents describe a resistance-type strength training apparatus combined with, in one instance, a treadmill, and in another instance an elliptical device.

In view of the foregoing, it would be desirable to provide the ability to track one's progress during exercise in a manner that is applicable to both aerobic and anaerobic activities and which is simple and effective. Additionally, it is a general desire in the industry to provide exercise equipment with new features and enhanced performance.

SUMMARY

In one aspect of the disclosure, a strength training apparatus includes a base member and a tower structure coupled with the base member.

In one or more other aspects that may be combined with any of the aspects herein, may further include at least one arm that is pivotally coupled with the tower structure.

In one or more other aspects that may be combined with any of the aspects herein, may further include a flywheel and a cable and pulley system associated with the at least one arm, wherein displacement of at least one cable of the cable and pulley system affects rotation of the flywheel.

In one or more other aspects that may be combined with any of the aspects herein, may further include a braking mechanism associated with a flywheel and configured to apply a selected resistance to the rotation of the flywheel.

In one or more other aspects that may be combined with any of the aspects herein, may further include a braking mechanism including a magnetic braking mechanism.

In one or more other aspects that may be combined with any of the aspects herein, may further include a torque sensor associated with the flywheel.

In one or more other aspects that may be combined with any of the aspects herein, may further include a console having at least one input device and at least one output device.

In one or more other aspects that may be combined with any of the aspects herein, may further include the console in communication with the braking mechanism, wherein the at least one input device controls the amount of resistance applied to the flywheel by the braking mechanism.

In one or more other aspects that may be combined with any of the aspects herein, may further include the console in communication with the torque sensor, wherein the at least one output device provides an indication of the amount of work expended by a user upon rotation of the flywheel.

In one or more other aspects that may be combined with any of the aspects herein, may further include the at least one output device provides the indication of the amount of work expended in units of watts.

In one or more other aspects that may be combined with any of the aspects herein, may further include the strength training apparatus including a drive mechanism associated with the flywheel.

In one or more other aspects that may be combined with any of the aspects herein, may further include a clutch mechanism coupled with the flywheel by way of a drive belt.

In one or more other aspects that may be combined with any of the aspects herein, may further include the clutch mechanism enabling the rotation of the flywheel in a first rotational direction upon the displacement of the at least one cable in a first defined direction, but has no effect on the

flywheel upon displacement of the at least one cable in a second defined direction, the second defined direction being the opposite of the first defined direction.

In one or more other aspects that may be combined with any of the aspects herein, may further include the drive mechanism having a drive chain coupled with the cable and pulley system, wherein the drive chain extends about a plurality of sprockets including at least one sprocket that is displaceable relative to the tower.

In one or more other aspects that may be combined with any of the aspects herein, may further include at least one biasing member coupled with the at least one displaceable sprocket.

In one or more other aspects that may be combined with any of the aspects herein, may further include an embodiment where the at least one arm includes a pair of arms, wherein the cable and pulley system includes a first pulley coupled with a first arm of the pair of arms with a first cable extending through the first pulley and a second pulley coupled with the second arm with a second cable extending through the second pulley.

In one or more other aspects that may be combined with any of the aspects herein, may further include the pair of arms maintained in a fixed angular position relative to each other.

In another aspect of the disclosure, a method of conducting strength training includes applying a force to a cable and displacing the cable in a first direction and affecting rotation of a flywheel upon displacement of the cable.

In one or more other aspects that may be combined with any of the aspects herein, may further include a resistance applied to the flywheel and the torque applied to the flywheel being measured, such as by way of a sensor.

In one or more other aspects that may be combined with any of the aspects herein, may further include calculating the work performed, in watts, based at least in part on the measured torque.

In one or more other aspects that may be combined with any of the aspects herein, may further include applying resistance to the flywheel by applying resistance using a magnetic brake.

In one or more other aspects that may be combined with any of the aspects herein, may further include the resistance applied by the magnetic brake being selectively varied.

In one or more other aspects that may be combined with any of the aspects herein, may further include applying a force to a cable including pulling the cable through a pulley, and selectively positioning the pulley at one of a variety of positions prior to pulling the cable through the pulley.

In one or more other aspects that may be combined with any of the aspects herein, may further include a method of tracking work expended during exercising including conducting an aerobic exercise activity and determining the work expended during the aerobic exercise activity and expressing the work expended in units of watts.

In one or more other aspects that may be combined with any of the aspects herein, may further include an embodiment where an anaerobic exercise activity is conducted and the work expended during the anaerobic exercise activity is determined and expressed in units of watts.

In one or more other aspects that may be combined with any of the aspects herein, may further include summing the amount of work expended during the aerobic activity and the amount of work expended during the anaerobic activity.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate various embodiments of the present methods and systems and are a part of the specification. The illustrated embodiments are merely examples of the present systems and methods and do not limit the scope thereof.

FIG. **1** is a perspective view of a strength training apparatus;

FIG. **2** is a first side view of the strength training apparatus shown in FIG. **1**;

FIG. **3** is another side view of the strength training apparatus shown in FIG. **1**;

FIGS. **4**A and **4**B show a side view and a rear view, respectively, of the apparatus shown in FIG. **1**, including various components, when the apparatus is in a first state; and

FIGS. **5**A and **5**B show a side view and a rear view, respectively, of the apparatus shown in FIG. **1**, including various components, when the apparatus is in a second state.

Throughout the drawings, identical reference numbers designate similar, but not necessarily identical, elements.

DETAILED DESCRIPTION

Referring to FIGS. **1-3**, a strength training apparatus **100** is provided. The apparatus **100**, according to certain embodiments, includes a base member **102** and a tower **104** or support structure coupled to, and extending upward from, the base member **102**. The base may be configured to include a plurality of legs **106**A-**106**C extending away from each other to provide a stable base or platform for the apparatus **100** and to support the apparatus **100** when forces are applied to it by someone using the apparatus **100** to exercise. In the embodiment shown in FIGS. **1-3**, the base member **102** includes three legs. However, it is noted that other configurations are contemplated.

A pair of arms **108**A and **108**B are pivotally coupled to the tower **104** by way of a bearing **110** or other mechanical structure. The bearing **110** enables the arms **108**A and **108**B to rotate about a defined axis **112** (FIGS. **2** and **3**) relative to the tower **104** and base member **102** as indicated by directional arrow **113** (FIG. **1**). In one embodiment, the arms **108**A and **108**B may be configured to maintain a constant angular relationship relative to each other as they are rotated about the axis **112** (e.g., they may continually extend in substantially opposite directions from each other). In another embodiment, each arm **108**A and **108**B may be selectively positionable (manually, or by a motor or other actuator (not shown)) independent of the other so that they may be positioned at any of a variety of angles relative to each other.

The apparatus **100** also includes a pair of pulleys **114**A and **114**B, one being pivotally coupled to the end of each arm **108**A and **108**B. Cables **116**A and **116**B extend through each pulley **114**A and **114**B and are coupled with handles **118**A and **118**B. As will be described in further detail below, the handles **118**A and **118**B, the cables **116**A and **116**B and the pulleys **114**A and **114**B are part of a cable/pulley system that provides resistance to an individual that is using the apparatus **100** for strength training.

As seen in FIGS. **2** and **3**, a flywheel **120** is coupled to either the base member **102** or the tower **104** (or to both) and configured to rotate about a shaft **122**. A resistance or braking mechanism **124** is positioned adjacent the flywheel **120** and is selectively adjustable so as to apply a desired level of resistance to the rotation of the flywheel **120**. Various types of braking mechanisms may be used including, in one embodiment, straps or pads that apply friction to the flywheel **120**. In one embodiment, a magnetic brake

(sometimes referred to as an eddy current brake) may be used to provide an adjustable level of resistance applied to the flywheel **120**.

When the braking mechanism **124** is configured as a magnetic mechanism it may include an arm **126** that is pivotally coupled with the tower **104** and which contains a plurality of magnets arranged to provide a desired magnetic flux. As the arm **126** is rotated relative to tower **104** (and, thus, the flywheel **120**), the magnetic flux through which the flywheel **120** rotates changes, thereby altering the amount of rotational resistance experienced by the flywheel **120**.

The flywheel **120**, when configured to interact with a magnetic braking mechanism, may include ferrous components, non-ferrous components, or both. In one embodiment, the flywheel **120** may include a relatively dense ferrous component to impart a desired level of rotational inertia to the flywheel **120**. The flywheel **120** may also include a nonferrous component to provide increased braking resistance when used with a magnetic brake mechanism. For example, one embodiment may include a portion that is formed of cast iron (a ferrous material) to provide the desired rotational inertia with another portion formed of an aluminum material (to provide increased braking response to the magnetic mechanism). One such configuration of a flywheel, as well as an associated magnetic braking mechanism, is described by U.S. Patent Application Publication No. 2012/0088638 to Lull (application Ser. No. 13/267,719), the disclosure of which is incorporated by reference herein in its entirety.

A torque sensor **128** may be associated with the shaft **122** to determine the amount of torque applied to the flywheel **120** by a drive mechanism (discussed below). Various types of torque sensors may be utilized. One example of a torque sensor includes that which is described in U.S. Pat. No. 7,011,326 to Schroeder et al., the disclosure of which is incorporated by reference herein in its entirety. Another example of a torque sensor includes that which is described in U.S. Pat. No. 7,584,673 to Shimizu, the disclosure of which is incorporated by reference herein in its entirety.

The apparatus further includes a control panel **130** which may be located adjacent the bearing **110** or some other convenient location (e.g., on the tower **104**). The control panel **130** may include various input devices **132** (e.g., buttons, switches or dials) and output devices **134** (e.g., LED lights, displays, alarms) to provide means of interaction with a user of the apparatus **100**. The control panel **130** may further include connections for communication with other devices. The controller may include a processor and memory to provide various functions in controlling components of the apparatus **100** (e.g., the braking mechanism), in communicating with various components (e.g., the torque sensor) and making certain calculations as will be discussed below.

In one example, one of the input devices **132** of the control panel **130** may be used to set a desired resistance level that is to be applied to the flywheel **120** by controlling an actuating member associated with the braking mechanism **124**. An output device **134** (e.g., a display) may indicate the current or selected level of resistance. An output device **134** of the control panel **130** may also provide an indication of the amount of work performed within a period of time calculated, for example, based on the torque applied to the flywheel **120** as measured by the torque sensor **128**.

Referring now to FIGS. **4**A and **4**B, a side view and a rear view of the apparatus **100** is shown with various components which may be disposed within the tower **104** or otherwise arranged to assist in driving flywheel **120**. It is noted that FIG. **4**B does not depict the arms **108**A and **108**B (and associated components) for purposes of clarity and convenience. A drive mechanism **140** may include a clutch mechanism **142** having an input shaft **144** and an output shaft **146**. A drive belt **148** (or drive chain or other similar drive structure) may extend about the output shaft **146** and also about the shaft **122** of the flywheel **120** (or associated pulleys coupled with the shafts). The clutch mechanism **142** is configured such that, when the input shaft **144** is rotated in a first specified direction, the output shaft **146** is likewise rotated in a specified direction displacing the drive belt **148** and, ultimately, driving the flywheel **120** in a desired direction. However, if the input shaft **144** is rotated in a second direction, opposite that of the first direction, it has no effect on the output shaft **146**. Rather, the output shaft **146** is enabled to continue rotating in its initially specified direction and does not reverse directions. It is noted that, in other embodiments, the clutch mechanism **142** may be coupled directly to the flywheel **120**.

A drive chain **150** (or drive belt or cable or other appropriate structure) has a first end **152** that is coupled to the cables **116**A and **116**B that extend through pulleys **114**A and **114**B and either extend through, or adjacent to, the arms **108**A and **108**B. The drive chain **150** extends through several pulleys or sprockets including, for example, a first sprocket **154**, the input shaft **144** (or an associated pulley or sprocket coupled therewith) and a second sprocket **156**. A second end **158** of the drive chain **150** may be fixed, for example, to a frame or other component associated with the tower **104**. In the embodiment shown in FIGS. **4**A and **4**B, the first sprocket **154** is rotatable about an axis which is fixed relative to the tower **104**. The second sprocket **156** is rotatable about an axis which is displaceable relative to the tower **104**. For example, one or more biasing members **160** may be coupled between the second sprocket **156** and the tower **104** (or some component thereof) enabling the second sprocket **156** to be displaced relative to the tower **104**. Guide members may be used to help constrain or control the displacement of the sprocket along a desired path.

Referring briefly to FIGS. **5**A and **5**B, views similar to those depicted in FIGS. **4**A and **4**B, respectively, show certain components in a second position or state. Specifically, FIG. **5**A depicts the displacement of a handle **118**A due to application of a force by an individual during exercise. Displacement of the handle **118**A results in displacement of the associated cable **116**A and, ultimately, displacement of the drive chain **150**. As indicated in FIG. **5**A, a first portion of the drive chain **150** is displaced upwards towards the first sprocket **154** as indicated by directional arrow **170** while a second portion of the drive chain **150** is displaced downwards away from the second sprocket **156** and towards the input shaft **144** as indicated by directional arrow **172**. It is noted that this displacement of the drive chain **150** also includes the downward displacement of the second sprocket **156** against the force of the biasing members **160** as seen in both FIGS. **5**A and **5**B. The displacement of the drive chain **150** results in the rotation of the input shaft **144**, actuating the drive mechanism **140** such that the drive belt **148** drives the flywheel **120**.

Upon release of the force applied to the handle **118**A, the biasing members **160** pull the second sprocket **156** back to its previous position bringing the various components (e.g., drive chain **150**, cable **116**A and handle **118**A) back to the positions shown in FIGS. **4**A and **4**B. However, as noted above, the return of the drive chain **150** to its previous position does not cause the flywheel **120** to rotate in the opposite direction or otherwise hinder its continued rotation

due to the directional preference of the clutch mechanism **142**. It is noted that, while the example shown in FIGS. **5**A and **5**B is described in terms of one particular handle (i.e., **118**A) being displaced, the same functionality applies to the displacement to the other handle (i.e., **118**B) or to both of them being substantially simultaneously displaced.

INDUSTRIAL APPLICABILITY

During exercise, many individuals desire to focus on anaerobic strength training, or to integrate anaerobic strength training with aerobic work-outs. One of the difficulties in mixing both aerobic and anaerobic activities is the ability of an individual to efficiently and effectively track their progress. For example, many individuals use aerobic exercise equipment such as a treadmill, an elliptical machine or a pedometer to help track the calories that they've burned while using such equipment. However, it is more difficult to track or calculate such information when doing strength training types of exercises.

The exercise apparatus provided herein provides a strength training apparatus that enables a variety of exercises while also providing the ability to track the work performed by an individual during their exercise session. By positioning the adjustable arms at different locations relative to the tower, different types of exercises may be conducted. For example, due to the adjustability of the arms/pulleys, the exercise apparatus may be used to perform exercises including, but not limited to, standing abdominal crunches, curls and other bicep exercises, lat pull-downs, chest presses, incline and decline presses, overhead presses, triceps extensions, shoulder extensions, leg extensions, leg curls, abduction and adduction exercises, and a variety of other exercises, including variations of the examples provided.

Additionally, the use of a flywheel in connection with a strength training apparatus provides a different form of resistance than in conventional strength training exercises, one that can be measured, tracked and incorporated into a planned exercise routine. The flywheel, combined with a braking mechanism such as a magnetic brake, enables considerable flexibility in setting the desired resistance during exercise. In many conventional strength training exercises, the amount of resistance provided (e.g., by free weights, weight stacks or resistance bands) is only adjustable in set increments (e.g., 5 or 10 pound increments). The use of a flywheel with a variable resistance braking mechanism enables fine tuning of the resistance over a continuous spectrum between two defined limits.

The use of a torque sensor in conjunction with the flywheel enables the calculation of work, power or energy so that, for example, a user of the apparatus may determine their performance level while using the exercise apparatus. In one particular example, the power expended during an exercise session may be expressed in watts (i.e., joules/sec (J/s) or newton meters I sec (N*m/s). A user of the machine can review the power expended during an exercise session from a display (or other output device) associated with the exercise apparatus and then compare their performance to a goal or a benchmark.

Such a way of tracking the effort expended during an anaerobic exercise routine provides more insight into the progress of the individual than just the number of repetitions completed during a given work-out session. If desired, other units may be utilized to track the energy expended by an individual during a work-out session. For example, rather than expressing the work-out performance in terms of watts (units of power), it could be expressed in terms of joules (units of work).

This information could be used with information from other work-out activities, including aerobic exercise, to consistently monitor the performance of an individual over a desired period of time. For example, rather than expressing the performance of an individual on a treadmill or an elliptical machine in terms of calories, those performances may similarly be provided in terms of watts (or another selected unit) so that all types of exercise activity may be monitored uniformly. An individual may then customize their exercise routine based, for example, on the amount of work that is to be performed regardless of whether that work occurs during an aerobic or an anaerobic activity.

One example of customizing a work-out that may be utilized in conjunction with the exercise apparatus described herein is set forth in U.S. patent application Ser. No. 13/754,361, filed on Jan. 30, 2013, which published on Aug. 1, 2013 as U.S. Patent Application Publication No. 2013/0196821 A1 ("the '821 Publication"), the disclosure of which is incorporated by reference herein in its entirety. One particular example of tracking a work-out across various exercise equipment and which may be utilized in conjunction with the exercise apparatus described herein is set forth in U.S. Pat. No. 6,746,371 to Brown et al., the disclosure of which is incorporated by reference herein in its entirety.

For example, FIG. 1 of the '821 Publication illustrates a block diagram of one embodiment of an environment 100 in which the present systems and methods may be implemented. In one configuration, an exercise apparatus 102 may exchange information with a client computing device 106. The client computing device 106 may acquire the information from the apparatus 102. For example, the information may be embedded as a data exchanging module 104 that is included on or by the exercise apparatus 102. Examples of the data exchanging module 104 may include, but are not limited to, barcodes, QR codes, RF tags, etc. The module 104 may be affixed or attached to an area of the apparatus 102 or an area that is not on the apparatus 102 (e.g., a wall close to the apparatus 102). The client computing device 106 may include a data sensing module 108 that is able to sense the data exchanging module 104. For example, the sensing module 108 may provide scanning capabilities that allows the device 106 to scan the data exchanging module 104 to obtain information about the apparatus 102. For example, the data exchanging module 104 may be a barcode and the data sensing module 108 may be a barcode scanner. In another embodiment, the data exchanging module 104 and the data sensing module 108 may include near field communication (NFC) capabilities. As a result, using NFC standards, a radio communication link may be established between the apparatus 102 and the device 106. The client computing device 106 may acquire the information from the exercise apparatus 102 via the radio communication link. The apparatus 102 and the device 106 may exchange information via other methods in addition to bar codes, QR codes, and NFC technologies.

Examples of the exercise apparatus 102 may include a weight machine (e.g., a fly machine, a leg press machine, a leg curl machine, a leg extension machine, a cable lateral pull-down machine, a triceps pull-down machine, a row machine, etc.). The exercise apparatus 102 may also be a free weight, such as a dumbbell, a medicine ball, an exercise ball, a bench press, etc. In another embodiment, the exercise apparatus 102 may be a cardio machine (e.g., a treadmill, a stationary bike, a spinner bike, a stair machine, etc.).

In one embodiment, the client computing device 106 may be a smartphone, a laptop, a tablet, or any other portable computing device. In one configuration, the client computing device 106 may be any device that is able to detect, receive, and interpret the data acquired from the data exchanging module 104. To interpret the received data, the client computing device 106 may communicate with a server 112 across a network 110 connection. The network 110 connection may be a Wi-Fi, a wireless local area network (WLAN), a cellular network, and the like. The server 112 may communicate with an exercise apparatus database 114. The database 114 may be external to the server 112, or the database 114 may be built into the server 112. In one embodiment, the exercise apparatus database 114 may store information regarding the exercise apparatus 102. For example, the database 114 may store instructions that indicate how to properly use the exercise apparatus 102. The database 114 may also store videos that demonstrate how to use the apparatus 102. In one example, the client computing device 106 may acquire information from the apparatus, such as an identifier that identifies the apparatus 102. The identifier may be communicated to the server 112. The server 112 may use the identifier to locate additional information in the database 114 about the apparatus 102. The server may communicate the additional information about the apparatus 102 to the computing device 106. In one embodiment, the data exchanging module 104 may include the additional information that is stored in the database 114. As a result, when the computing device 106 acquires the information from the apparatus 102, there may be no need for the client 106 to communicate with the server 112 to acquire the additional information.

FIG. 2 of the '821 Publication is a block diagram illustrating one embodiment of a client computing device 106-a. The client computing device 106-a may be an example of the client computing device 106 illustrated in FIG. 1 of the '821 Publication. In one example, the client computing device 106-a may include a data sensing module 108-a. In one configuration, the module 108-a may include a QR code module 202, a barcode reading module 204, an NFC module 206, a profile module 208, a customized workout module 210, and a tracking module 212. Details regarding each of these modules will be described below.

In one embodiment, the QR code module 202 may sense data affixed to or by the exercise apparatus 102 that is encoded as a QR code. Similarly, the barcode reading module 204 may sense data embedded or encoded as a barcode that may be attached to or near the exercise apparatus 102. The modules 202 and 204 may sense the data by scanning the QR code or the barcode that is attached to the exercise apparatus 102. The NFC module 206 may establish a radio communication link with the exercise apparatus 102. The NFC module 206 may acquire data from the exercise apparatus 102 via the radio communication link.

In one configuration, the profile module 208 may receive and store input from a user relating to the user's profile information. Examples of profile information may include the user's age, height, weight, etc. The profile module 208 may further receive and store input from the user relating to physical fitness goals of the user. Examples of physical fitness goals may include a desired weight loss, strength conditioning goals, target heart rate goals, running/walking distance goals, specific muscle definition goals etc. The customized workout module 210 may receive the data sensed from the modules, 202, 204, and/or 206. The workout module 210 may also receive information stored by the profile module 208. In one embodiment, the workout module 210 may generate a customized workout routine for the user to perform with the exercise apparatus 102 in order to progress towards achieving the physical fitness goals stored in the profile module.

As an example, the client computing device 106-a may receive data relating to the exercise apparatus 102. The data may indicate the name of the apparatus 102, the functions of the exercise apparatus 102, instructions on how to properly use the exercise apparatus 102, the muscle group focused on by the exercise apparatus 102, the health benefits of using the apparatus 102, video or other multimedia data that demonstrate how to use the apparatus 102, etc. The data may be received directly from the data exchange module 104 affixed to the apparatus 102 and/or from the server 112 that obtains the data from the database 114 and communicates the data to the client computing device 106. The customized workout module 210 may analyze the received data about the exercise apparatus 102 together with the information stored by the profile module 208. Based on this analysis, the customized workout module 210 may generate a workout routine for the user to perform with the exercise apparatus 102. The generated workout routine may be focused on helping the user accomplish one or more physical fitness goals stored by the profile module 208. For example, the user may specify a physical fitness goal of bench pressing 200 lbs. The profile module 208 may also include information that indicates that the user is currently able to bench 160 lbs. The user may then approach a chest fly machine with the client computing device 106-a. A barcode may be affixed on a portion of the machine. The computing device 106-a may scan the barcode and obtain data about the machine. As stated above, the data may be acquired from the scan of the barcode and/or from the server 112. For example, the client 106-a may scan the barcode and retrieve the identity of the machine (in this example, a chest fly machine). The identity may be transmitted to the server 112. The server 112 may use the received identity to search the database 114 for data about the machine. The server 112 may then communicate the data back to the client computing device 106-a.

The data (either obtained directly from the exercise apparatus 102 and/or from the server 112) may indicate that the chest fly machine focuses on certain chest muscles. The data may also include a video demonstration that illustrates how to properly use the chest fly machine. The customized workout module 210 may generate a workout routine (e.g., number of repetitions, sets, and the weight resistance) for the user to follow when using the chest fly machine. The routine may be generated based on an analysis of the information stored by the profile module 208 as well as the data acquired from the exercise apparatus (directly and/or indirectly from the server 112). The workout routine may be customized for the user to assist the user to accomplish the physical fitness goal(s) included in the profile module. As a result, the workout routine, if followed by the user, may assist the user to accomplish the goal of bench pressing 200 lbs.

In one example, the profile module 208 may not include physical fitness goal information that relates to a certain exercise apparatus 102. For instance, the sensing module 108-a may acquire information relating to a treadmill by scanning a barcode, QR code, etc. The customized workout module 210 may analyze the profile module 208 and discover that the user has not entered a goal that may be accomplished by using the treadmill. In one configuration, the customized module 210 may query the user as to whether the user would like to enter a physical fitness goal that may be achieved by using the treadmill. For example, the module 210 may display the following query "Do you want to set a

goal to run 3 miles in 30 minutes?" If the user selects this goal, the workout module 210 may continue to generate a customized workout routine for the user to assist the user to complete this goal. Instead of selecting a goal generated by the customized workout module 210, the user may provide his/her own goal as it relates to the treadmill. Once the goal is provided, the module 210 may generate a customized workout routine.

The tracking module 212 may track the progress of the user while the user is using the exercise apparatus 102. For example, the tracking module 212 may be a camera or other tracking device that is capable of monitoring the movement of the user. The tracking module 212 may also track the progress of the user towards completing the goals specified in the profile module 208. For example, the profile module 208 may include a goal to lose 20 lbs. The tracking module 212 may track the weight of the user to allow the user to see his/her progress towards achieving the goal of losing 20 pounds. In one example, the user may manually enter his/her weight into the tracking module 212. In another embodiment, the tracking module 212 may track the progress of the user by receiving automatic updates via email, SMS messages, and the like that include the current state of the user. For example, the user may visit a website and record his/her weight on the website. The website may communicate with the tracking module 212 to provide the updated weight of the user.

FIG. 3 of the '821 Publication is a block diagram illustrating one embodiment of a profile module 208-a. The profile module 208-a may be an example of the profile module 208 illustrated in FIG. 2 of the '821 Publication. In one configuration, the profile module **208**-*a* may include a personal information module 302 and a goal information module 304.

In one embodiment, the personal information module 302 may include personal information about the user, such as, but not limited to, the user's age, height, weight, resting heart rate, and any other biometric information. The goal information module 304 may include physical fitness goals provided by the user. For example, the goal information module 304 may store a weight loss goal, a strength conditioning goal, a cardio goal, and the like. In one example, the user may manually input information to the modules 302, 304 via interfaces provided by the client computing device 106. In another embodiment, the user may provide the information to the modules 302, 304 remotely by interfacing with a website and inputting the information. The information may then be transmitted from the website to the client computing device 106 and stored as part of the modules 302, 304.

FIG. 4 of the '821 Publication is a block diagram illustrating one embodiment of a customized workout module 210-a. The module 210-a may be an example of the customized workout module 210 of FIG. 2 of the '821 Publication. In one embodiment, the module 210-a may include a profile analysis module 402, an exercise apparatus analysis module 404, a workout generation module 406, and a demonstration generation module 408.

In one configuration, the profile analysis module 402 may analyze information provided by the profile module 208. The information provided by the profile module 208 may include the physical fitness goals entered by the user. The workout generation module 404 may generate a customized workout routine for the user with relation to the exercise apparatus 102. For example, the exercise apparatus 102 may be a dumbbell. The profile analysis module 402 may determine that the user has set a goal to be able to do 10 repetitions of a bicep curl using a 50 pound dumbbell. The profile analysis module 402 may further determine from the information provided by the profile module 208 that the user has previously performed curls using 25 lb dumbbells. The exercise apparatus analysis module 404 may analyze data about the apparatus. The data may be received by scanning a barcode, QR code, etc. that may be affixed to the apparatus. The profile analysis module 402 may determine from the specific muscles focused on by the exercise apparatus.

The workout generation module 406 may generate a schedule of workouts for dumbbells of various weights that will gradually build up the user's bicep muscles to eventually reach the user's goal of performing 10 repetitions of a bicep curl using a 50 lb dumbbell. For example, the generation module 406 may suggest the user begin by performing 3 sets of 10 repetitions using 25 lb dumbbells. The generated workout may instruct the user to perform this workout four times a week. The generation module 406 may generate a workout that specifies that each week the weight of the dumbbell should be increased by 5 lbs. As a result, based on the goals provided by the user, the generation module 404 may generate a customized workout for a particular exercise apparatus 102 to assist the user to achieve his/her goals.

The demonstration generation module 408 may generate and/or provide a demonstration of how to use the exercise apparatus 102. For example, the generation module 408 may generate and/or provide a video that the user may view on the client computing device 106 to learn how to properly use the exercise apparatus 102. The demonstration generation module 408 may also generate and/or provide a text document that the user may read that includes instructions on how to use the exercise apparatus 102.

FIG. 5 of the '821 Publication is a block diagram illustrating one embodiment of an exercise apparatus 102-a and a tracking module 212-a. In one example, the exercise apparatus 102-a may be an example of the exercise apparatus 102 illustrated in FIG. 1 of the '821 Publication. The tracking module 212-a may be an example of the tracking module 212 illustrated in FIG. 2 of the '821 Publication.

In one embodiment, the exercise apparatus 102-a may include a monitoring apparatus 502-a-1. The monitoring apparatus 502-a-1 may monitor the user while the user is using the exercising apparatus 102-a. For example, the monitoring apparatus 502-a-1 may be a camera installed or connected to the exercise apparatus 102-a. The apparatus 502-a-1 may also be a magnetic strip attached to the exercise apparatus 102-a that detects movement of the apparatus 102 (e.g., a dumbbell). The monitoring apparatus 502-a-1 may record the actions of the user while the user is performing exercises using the exercising apparatus 102-a. The recorded actions may be transmitted to the tracking module 212-a.

The tracking module 212-a may also include a monitoring apparatus 502-a-2 to record the actions of the user while the user is engaged with a particular exercise apparatus. The apparatus 502-a-2 may be a camera, or other tracking device to record the activity of the user. The tracking module 212-a may further include a workout history module 504 and a goal monitoring module 506. The workout history module 504 may store information regarding past workouts performed by the user. For example, the monitoring apparatuses 502-a-1 and/or 502-a-2 may monitor a user running on a treadmill for 30 minutes. At the conclusion of the 30 minutes, the monitoring apparatus 502 may communicate the information to the workout history module 504. If the user is using a weight machine, the monitoring apparatus 502 may detect the number of repetitions as well as the

weight used during the repetitions. As a result, the workout history module 504 may include a log that documents the past workout activity of the user with various exercise machines.

In one embodiment, the goal monitoring module 506 may monitor the goals specified by the user. The module 506 may track the progress of the user with respect to achieving the goals. For example, the goal monitoring module 506 may communicate with the workout history module 504 to determine whether the user has satisfied a particular goal. The monitoring module 506 may generate a transmit goal update message to the user (e.g., via email, SMS text, etc.) that indicate to the user the user's progress in completing a goal. The module 506 may also send a goal completed message to the user when it is determined that a physical fitness goal has been accomplished.

FIG. 9 of the '821 Publication depicts a block diagram of a computer system 910 suitable for implementing the present systems and methods. The computer system 910 may be an example of the client computing device 106 of FIG. 1 of the '821 Publication. Computer system 910 includes a bus 912 which interconnects major subsystems of computer system 910, such as a central processor 914, a system memory 917 (typically RAM, but which may also include ROM, flash RAM, or the like), an input/output controller 918, an external audio device, such as a speaker system 920 via an audio output interface 922, an external device, such as a display screen 924 via display adapter 926, serial ports 928 and 930, a keyboard 932 (interfaced with a keyboard controller 933), multiple USB devices 992 (interfaced with a USB controller 991), a storage interface 934, a floppy disk unit 937 operative to receive a floppy disk 938, a host bus adapter (HBA) interface card 935A operative to connect with a Fibre Channel network 990, a host bus adapter (HBA) interface card 935B operative to connect to a SCSI bus 939, and an optical disk drive 940 operative to receive an optical disk 942. Also included are a mouse 946 (or other point-and-click device, coupled to bus 912 via serial port 928), a modem 947(coupled to bus 912 via serial port 930), and a network interface 948(coupled directly to bus 912).

Bus 912 allows data communication between central processor **914** and system memory 917, which may include read-only memory (ROM) or flash memory (neither shown), and random access memory (RAM) (not shown), as previously noted. The RAM is generally the main memory into which the operating system and application programs are loaded. The ROM or flash memory can contain, among other code, the Basic Input-Output system (BIOS) which controls basic hardware operation such as the interaction with peripheral components or devices. For example, the data sensing module 108-b to implement the present systems and methods may be stored within the system memory 917. Applications resident with computer system 910 are generally stored on and accessed via a non-transitory computer readable medium, such as a hard disk drive (e.g., fixed disk 944), an optical drive (e.g., optical drive 940), a floppy disk unit 937, or other storage medium. Additionally, applications can be in the form of electronic signals modulated in accordance with the application and data communication technology when accessed via network modem 947 or interface 948.

In one configuration, when the portable device retrieves information about an exercise machine, the portable device may also access physical fitness goals for the user. The user may have previously entered the goals or, upon retrieving information about an exercise machine, the portable device may query the user to select or enter physical fitness goals. Upon accessing the goals, the information about the exercise machine may be analyzed to determine whether the exercise machine may assist the user to accomplish one or more of the goals. If the machine cannot help the user accomplish the provided goals, the user may be queried as to whether he/she would like to select (or provide) a goal that this particular exercise machine may help the user accomplish. If the machine is able to assist the user in completing a goal, a customized workout routine may be generated and displayed to the user. The workout routine may provide instructions to the user relating to the number of repetitions, sets, the amount of weight, the amount of time, speed, incline, resistance, etc., that the user should perform to accomplish a goal using the exercise machine.

The invention claimed is:

1. A strength training apparatus comprising:

a tower;

a first arm and a second arm each pivotally coupled with the tower and each being configured to be selectively positionable independent of each other at multiple angles relative to each other;

a first pulley coupled to an end of the first arm;

a first cable extending through the first arm and the first pulley;

a second pulley coupled to an end of the second arm;

a second cable extending through the second arm and the second pulley;

a magnetic mechanism coupled to the first cable and the second cable and configured to provide multiple levels of resistance to a user pulling on the first cable and/or the second cable; and

a control panel located on the tower, the control panel including:

a processor and a memory configured to control a current level of resistance provided by the magnetic mechanism,

an input device configured to allow the user to set the current level of resistance provided by the magnetic mechanism, and

an output device configured to display the current level of resistance provided by the magnetic mechanism.

2. The strength training apparatus of claim **1**, further comprising:

a first handle coupled to the first cable; and

a second handle coupled to the second cable.

3. The strength training apparatus of claim **1**, wherein:

the processor and the memory are further configured to calculate an amount of power expended within a period of time by the user pulling on the first cable and/or the second cable; and

the output device is further configured to display the calculated amount of power.

4. The strength training apparatus of claim **1**, wherein the processor and the memory are further configured to receive and store a physical fitness goal that is inputted by the user via the input device.

5. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to provide a customized workout routine for the strength training apparatus based on the stored physical fitness goal.

6. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to generate a schedule of upcoming customized workout routines for the strength training apparatus based on the stored physical fitness goal.

7. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to track progress of the user toward completing the stored physical fitness goal.

8. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to display on the output device a progress of the user toward completing the stored physical fitness goal.

9. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to display on the output device that the user has achieved the stored physical fitness goal when it is determined that the stored physical fitness goal has been achieved.

10. The strength training apparatus of claim **4**, wherein the processor and the memory are further configured to display videos on the output device that demonstrate how to use the strength training apparatus.

11. The strength training apparatus of claim **1**, wherein the processor and the memory are further configured to store information regarding past workout routines performed by the user on the strength training apparatus.

12. The strength training apparatus of claim **11**, wherein:

the stored information regarding the past workout routines includes a most recent level of resistance provided by the magnetic mechanism; and

the processor and the memory are further configured to suggest that the user begin an upcoming workout routine at the stored most recent level of resistance.

13. The strength training apparatus of claim **1**, wherein the processor and the memory are further configured to track an amount of time that the user used the strength training apparatus.

14. The strength training apparatus of claim **1**, wherein the processor and the memory are further configured to receive from the user, and store, an age of the user, a height of the user, and a weight of the user.

15. The strength training apparatus of claim **1**, wherein the control panel further includes a connection for communication with another device.

16. The strength training apparatus of claim **15**, wherein the connection includes a radio communication link.

17. The strength training apparatus of claim **15**, further comprising an application program configured to be loaded on the other device.

18. The strength training apparatus of claim **17**, wherein the application program is configured to:

display information regarding past workout routines performed by the user on the strength training apparatus; and

display a schedule of customized workout routines for the strength training apparatus based on a stored physical fitness goal that was inputted by the user.

19. A strength training apparatus comprising:

a tower;

a first arm and a second arm each pivotally coupled with the tower and each being configured to be selectively positionable independent of each other to be selectively positioned at multiple angles relative to each other;

a first pulley coupled to an end of the first arm;

a first cable extending through the first arm and the first pulley;

a second pulley coupled to an end of the second arm;

a second cable extending through the second arm and the second pulley;

a magnetic mechanism coupled to the first cable and the second cable and configured to provide multiple levels of resistance to a user pulling on the first cable and/or the second cable; and

a control panel located on the tower, the control panel including:

a processor and a memory configured to control a current level of resistance provided by the magnetic mechanism, the processor and the memory further configured to calculate an amount of power expended within a period of time by the user pulling on the first cable and/or the second cable,

an input device configured to allow the user to set the current level of resistance provided by the magnetic mechanism, and

an output device configured to display the current level of resistance provided by the magnetic mechanism, the output device further configured to display the calculated amount of power.

20. A strength training apparatus comprising:

a tower;

a first arm and a second arm each pivotally coupled with the tower and each being configured to be selectively positionable independent of each other to be selectively positioned at multiple angles relative to each other;

a first pulley coupled to an end of the first arm;

a first cable extending through the first arm and the first pulley;

a second pulley coupled to an end of the second arm;

a second cable extending through the second arm and the second pulley;

a magnetic mechanism coupled to the first cable and the second cable and configured to provide multiple levels of resistance to a user pulling on the first cable and/or the second cable; and

a control panel located on the tower, the control panel including:

a processor and a memory configured to control a current level of resistance provided by the magnetic mechanism, the processor and the memory further configured to receive and store a physical fitness goal that is inputted by the user via the input device, the processor and the memory further configured to provide a customized workout routine for the strength training apparatus based on the stored physical fitness goal,

an input device configured to allow the user to set the current level of resistance provided by the magnetic mechanism, and

an output device configured to display the current level of resistance provided by the magnetic mechanism.

* * * * *

EXHIBIT B

US010758767B2

(12) **United States Patent**
Olson et al.

(10) **Patent No.: US 10,758,767 B2**
(45) **Date of Patent: Sep. 1, 2020**

(54) **RESISTANCE MECHANISM IN A CABLE EXERCISE MACHINE**

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(Continued)

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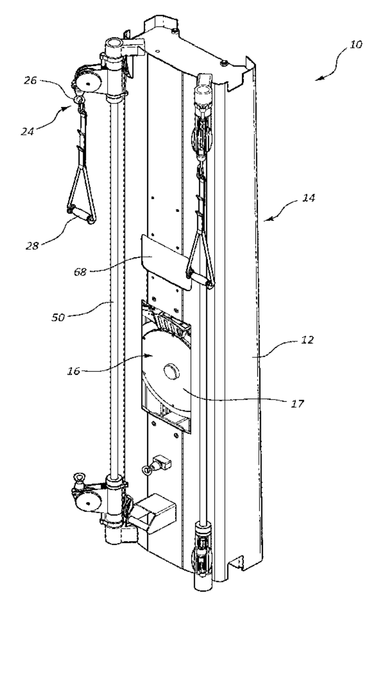
(57) **ABSTRACT**

A cable exercise machine includes a first pull cable and a second pull cable incorporated into a frame. Each of the first pull cable and the second pull cable are linked to at least one resistance mechanism. The at least one resistance mechanism includes a flywheel and a magnetic unit arranged to resist movement of the flywheel.

20 Claims, 7 Drawing Sheets



Related U.S. Application Data

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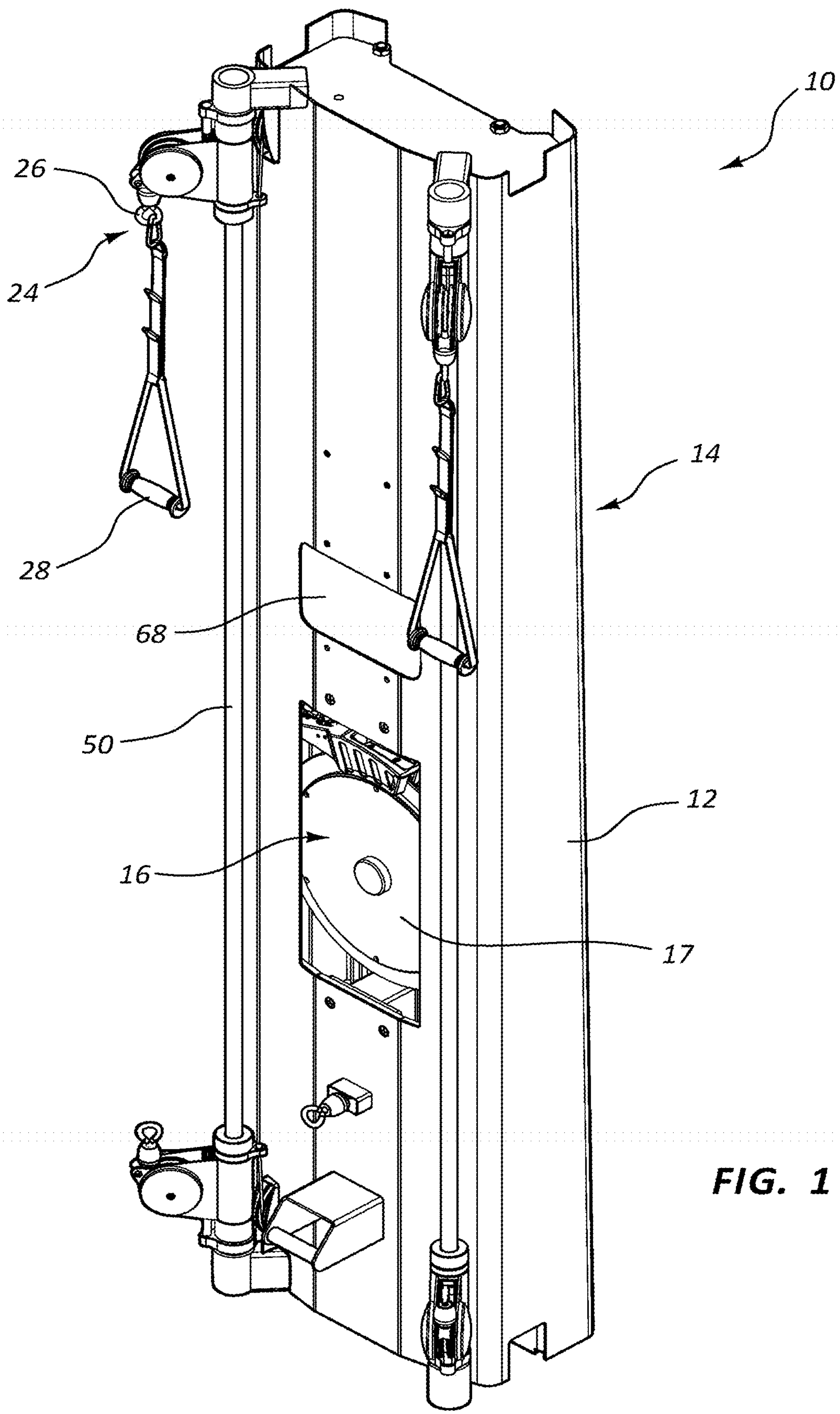

FIG. 1

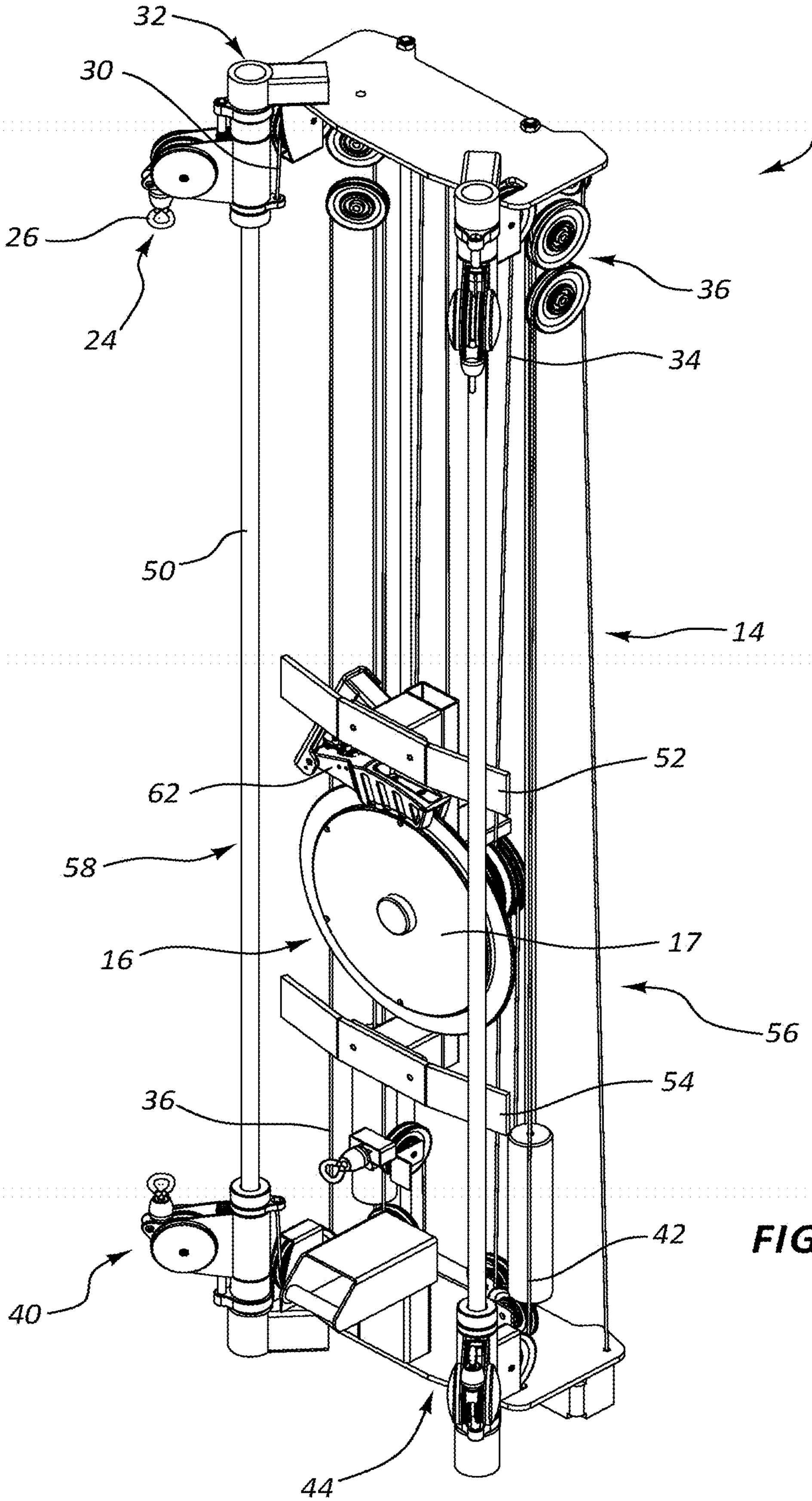

FIG. 2

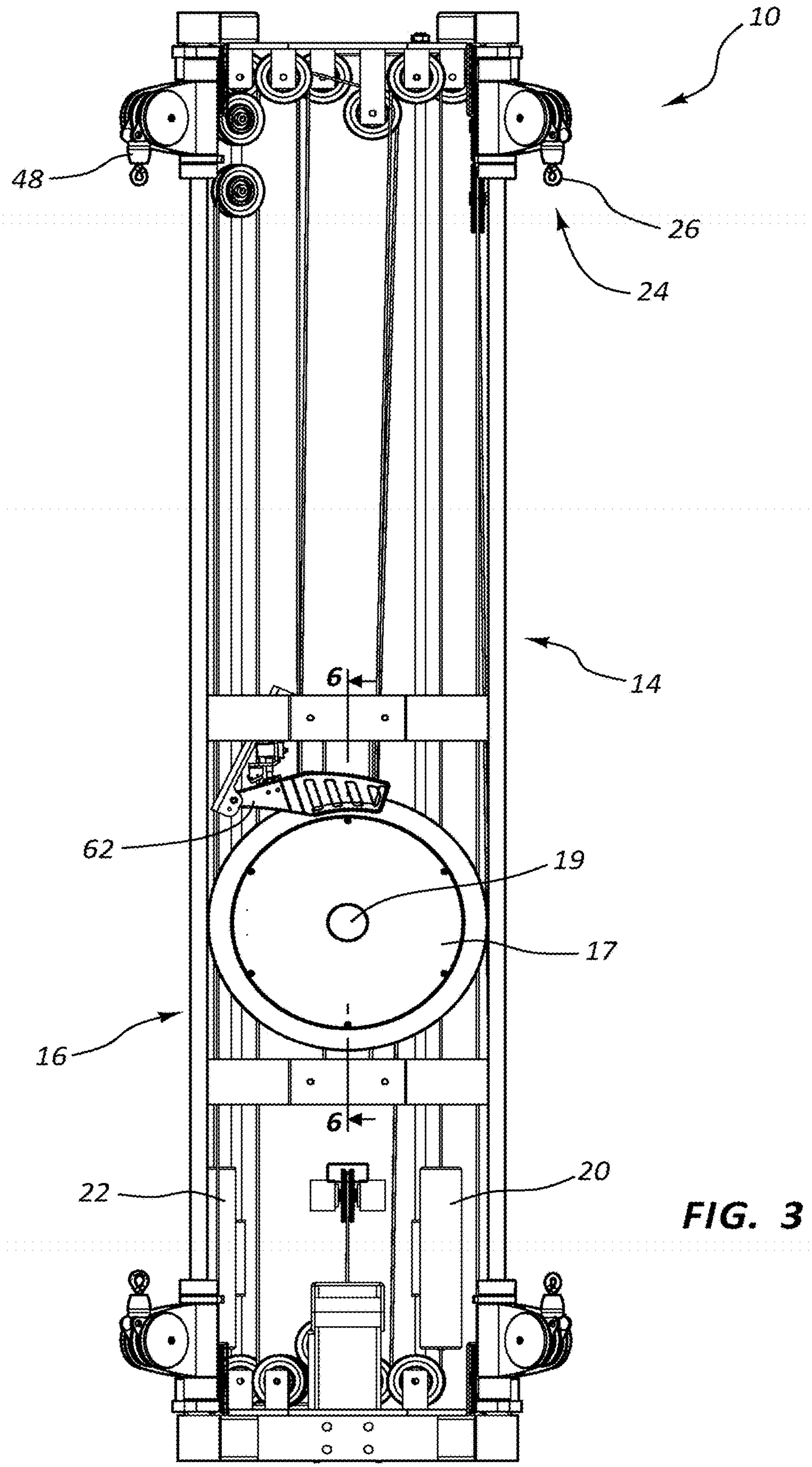

FIG. 3

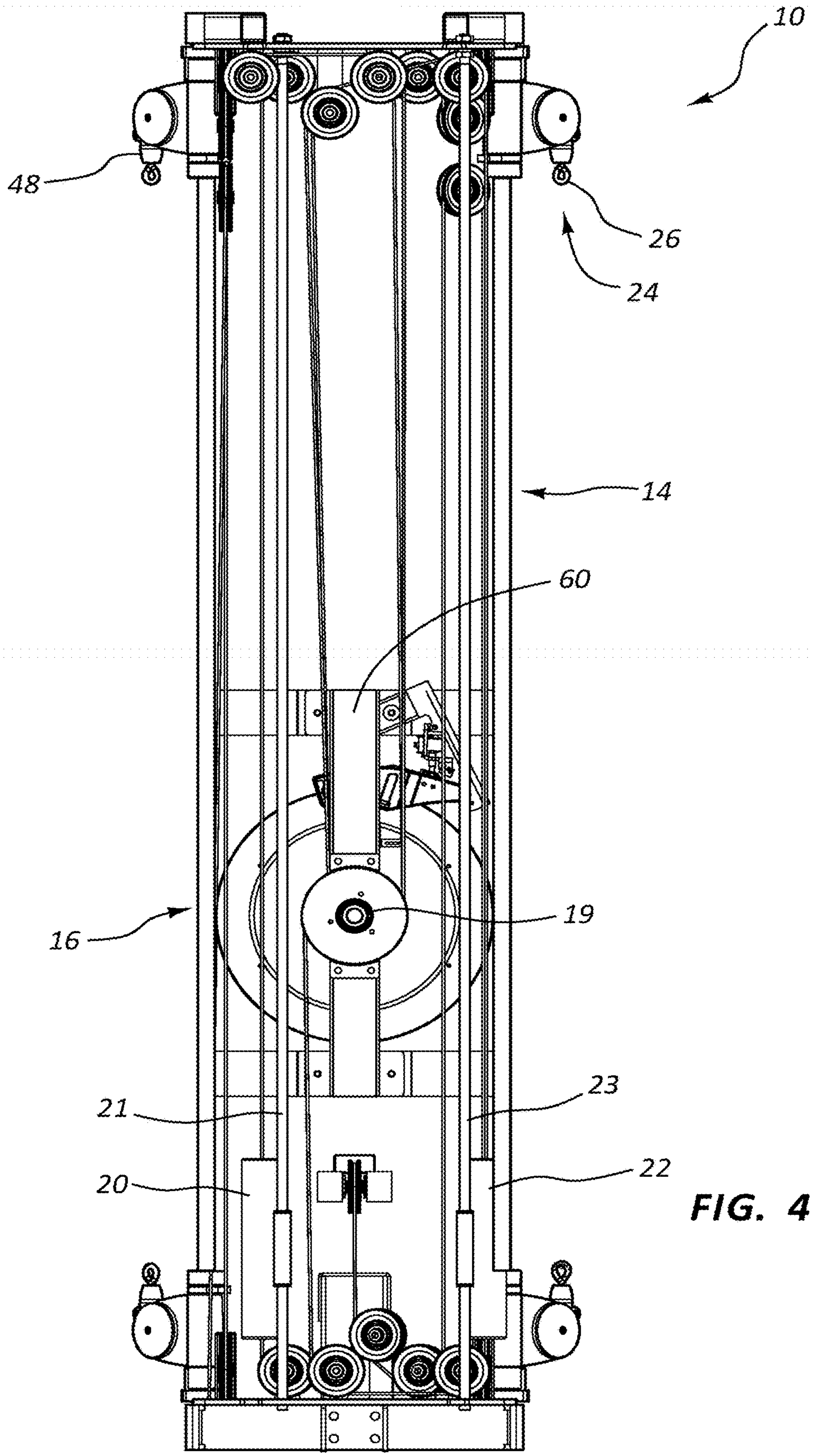

FIG. 4

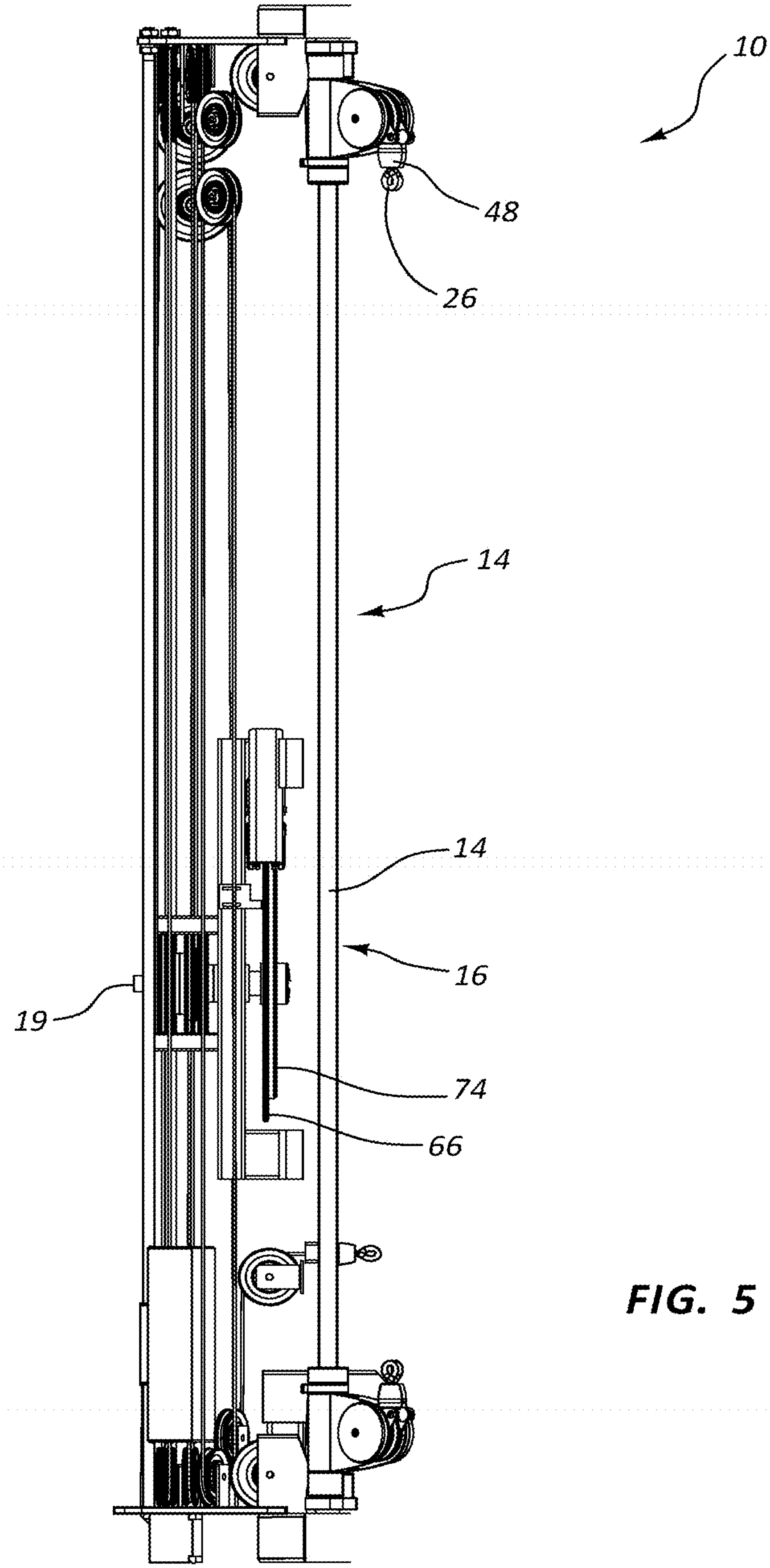

FIG. 5

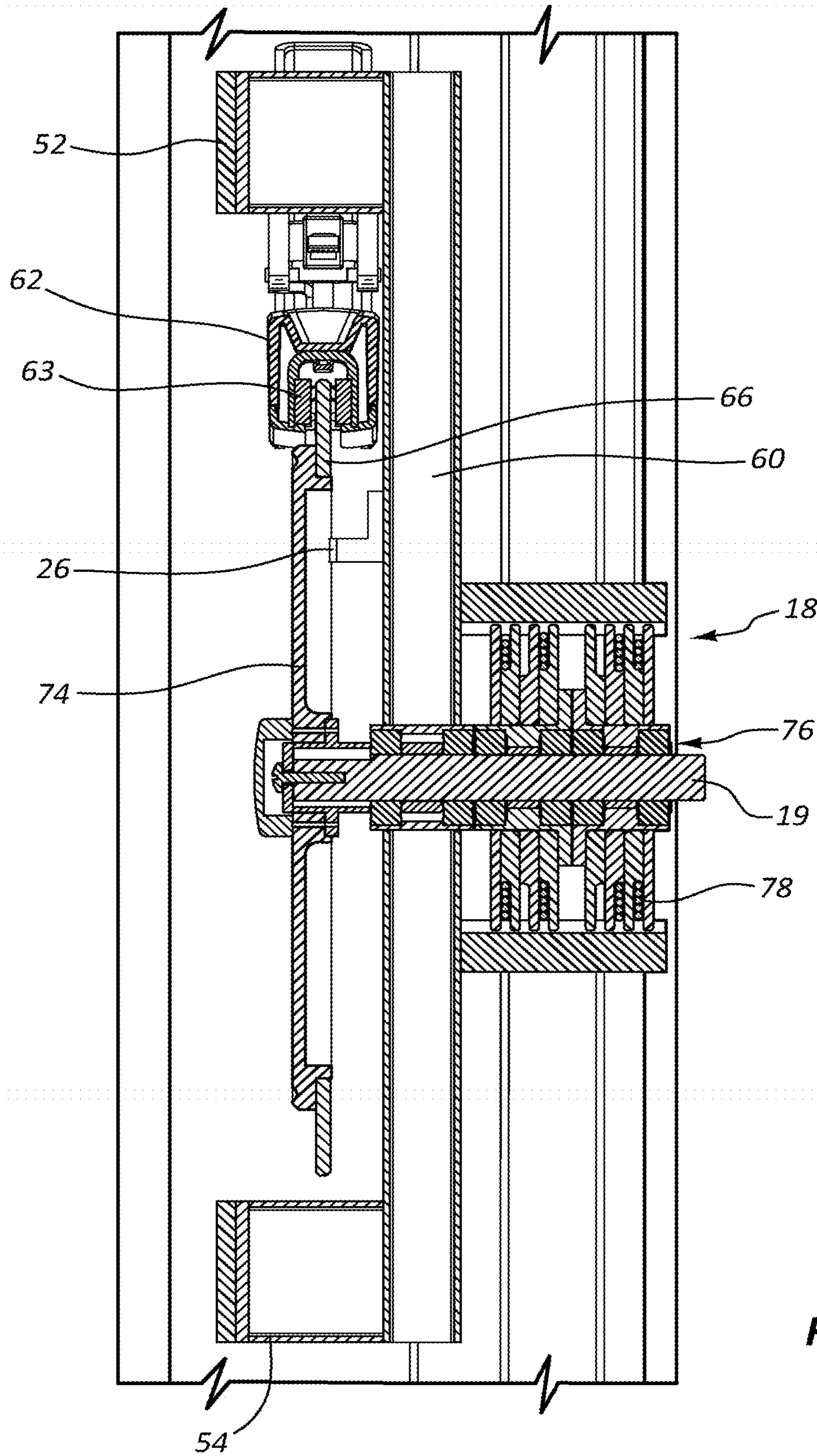

FIG. 6

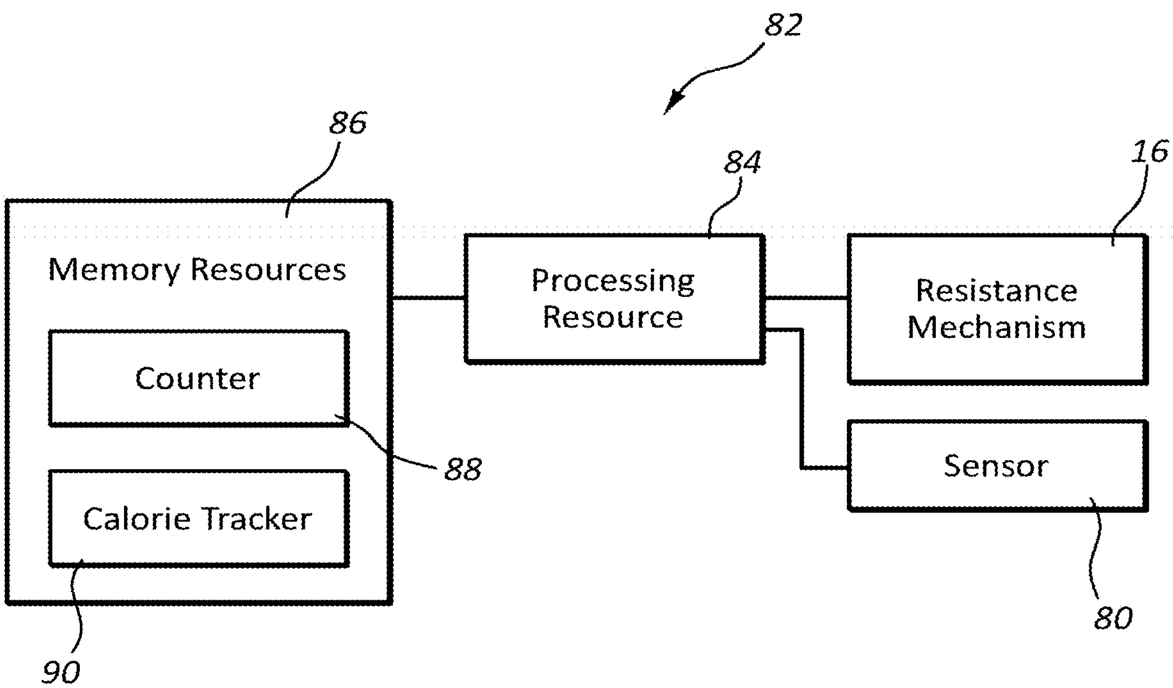
82
86
84
16
Memory Resources
Counter
Calorie Tracker
Processing Resource
Resistance Mechanism
Sensor
88
80
90

FIG. 7

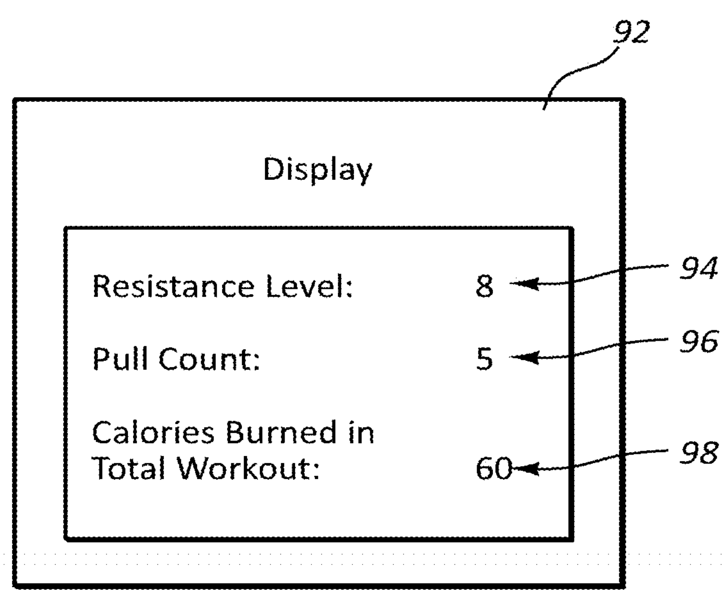
92
Display
Resistance Level: 8
Pull Count: 5
Calories Burned in Total Workout: 60
94
96
98

FIG. 8

RESISTANCE MECHANISM IN A CABLE EXERCISE MACHINE

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 15/976,496 filed May 10, 2018, now U.S. Pat. No. 10,188,890, which is a continuation of U.S. patent application Ser. No. 15/696,841 filed Sep. 6, 2017, now U.S. Pat. No. 9,968,816, which is a continuation of U.S. patent application Ser. No. 15/226,703 filed Aug. 2, 2016, now U.S. Pat. No. 9,757,605, which is a continuation of U.S. patent application Ser. No. 14/582,493 filed Dec. 24, 2014, now U.S. Pat. No. 9,403,047, which claims priority to provisional Patent Application No. 61/920,834 filed Dec. 26, 2013. Each of these applications is herein incorporated by reference in its entirety.

BACKGROUND

While there are numerous exercise activities that one may participate in, exercise may be broadly classified into categories of aerobic exercise and anaerobic exercise. Aerobic exercise generally refers to activities that substantially increase the heart rate and respiration of the exerciser for an extended period of time. This type of exercise is generally directed to enhancing cardiovascular performance. Such exercise usually includes low or moderate resistance to the movement of the individual. For example, aerobic exercise includes activities such as walking, running, jogging, swimming, or bicycling for extended distances and extended periods of time.

Anaerobic exercise generally refers to exercise that strengthens skeletal muscles and usually involves the flexing or contraction of targeted muscles through significant exertion during a relatively short period of time and/or through a relatively small number of repetitions. For example, anaerobic exercise includes activities such as weight training, push-ups, sit-ups, pull-ups, or a series of short sprints.

To build skeletal muscle, a muscle group is contracted against resistance. The contraction of some muscle groups produces a pushing motion, while the contraction of other muscle groups produces a pulling motion. A cable machine is a popular piece of exercise equipment for building those muscle groups that produce pulling motions. A cable machine often includes a cable with a handle connected to a first end and a resistance mechanism connected to a second end. Generally, the resistance mechanism is connected to a selectable set of weights. A midsection of the cable is supported with at least one pulley. To move the cable, a user pulls on the handle with a force sufficient to overcome the force of the resistance mechanism. As the cable moves, the pulley or pulleys direct the movement of the cable and carry a portion of the resistance mechanism's load.

One type of cable exercise machine is disclosed in WIPO Patent Publication No. WO/2007/015096 issued to Andrew Loach. In this reference, an exercise apparatus allows the user to perform a variety of aerobic and strength training exercises. A user input means allows the user to apply torque to an input shaft of a resistance unit. A control means adjusts the resistance provided by a resistance means coupled to the input shaft according to the output of a number of sensors. In a preferred embodiment, the resistance unit is able to simulate at the input shaft the dynamic response of a damped flywheel or the dynamic response of an object driven through a viscous medium, or to maintain the resistance at a constant level that is set by the user. The resistance unit includes a battery or an electric generator device and can be operated without connection to an external power source. Other types of cable exercise machines are described in U.S. Patent Publication Nos. 2012/0065034 issued to Andrew Loach and 2006/0148622 issued to Ping Chen. All of these references are herein incorporated by reference for all that they disclose.

SUMMARY

In one aspect of the invention, a cable exercise machine includes a first pull cable and a second pull cable incorporated into a frame.

In one aspect of the invention, the cable exercise machine may further include that each of the first pull cable and the second pull cable are linked to at least one resistance mechanism.

In one aspect of the invention, the at least one resistance mechanism comprises a flywheel and a magnetic unit arranged to resist movement of the flywheel.

In one aspect of the invention, the cable exercise machine may further include a sensor arranged to collect information about a position of the flywheel.

In one aspect of the invention, the cable exercise machine may further include a counter in communication with the sensor and arranged to track a number of rotations of the flywheel.

In one aspect of the invention, the counter is arranged to provide the number as input to an energy tracker.

In one aspect of the invention, the energy tracker is arranged to receive as input a level of magnetic resistance exerted on the flywheel with the magnetic unit.

In one aspect of the invention, the frame is a tower.

In one aspect of the invention, the cable exercise machine may further include that a third pull cable and a fourth pull cable are also incorporated into the tower.

In one aspect of the invention, the cable exercise machine may further include that a first handle end of the first pull cable is routed to an upper right location of the tower.

In one aspect of the invention, the cable exercise machine may further include that a second handle end of the second pull cable is routed to an upper left location of the tower.

In one aspect of the invention, the cable exercise machine may further include that a third handle end of the third pull cable is routed to a lower right location of the tower.

In one aspect of the invention, the cable exercise machine may further include that a fourth handle end of the fourth pull cable is routed to a lower left location of the tower.

In one aspect of the invention, the flywheel is positioned between the upper right location, the upper left location, the lower right location, and the lower left location.

In one aspect of the invention, the cable exercise machine may further include at least two of the first pull cable, the second pull cable, the third pull cable and the fourth pull cable are connected to the same resistance mechanism.

In one aspect of the invention, the flywheel is attached to a central shaft about which the flywheel is arranged to rotate and the central shaft supports multiple cable spools.

In one aspect of the invention, the multiple cable spools are attached to at least one of the first pull cable, the second pull cable, the third pull cable, and the fourth pull cable.

In one aspect of the invention, the flywheel is arranged to rotate in just a single direction while at least one of the multiple spools are arranged to rotate in the single direction and an opposite direction.

In one aspect of the invention, the spools are linked to at least one counterweight.

In one aspect of the invention, an cable exercise machine may include a first pull cable, a second pull cable, a third pull cable, and a fourth pull cable incorporated into a tower.

In one aspect of the invention, the cable exercise machine may further include that a first handle end of the first pull cable is routed to an upper right location of the tower, a second handle end of the second pull cable is routed to an upper left location of the tower, a third handle end of the third pull cable is routed to a lower right location of the tower, and a fourth handle end of the fourth pull cable is routed to a lower left location of the tower.

In one aspect of the invention, each of the first pull cable, the second pull cable, the third pull cable, and the fourth pull cable are connected to a resistance mechanism.

In one aspect of the invention, the resistance mechanism comprises a flywheel and a magnetic unit arranged to resist movement of the flywheel.

In one aspect of the invention, the flywheel is positioned between the upper right location, the upper left location, the lower right location, and the lower left location.

In one aspect of the invention, the cable exercise machine may further include a sensor arranged to collect information about a position of the flywheel.

In one aspect of the invention, the flywheel is attached to a central shaft about which the flywheel is arranged to rotate and the central shaft supports multiple cable spools.

In one aspect of the invention, the multiple cable spools are attached to at least one of the first pull cable, the second pull cable, the third pull cable, and the fourth pull cable.

In one aspect of the invention, the flywheel is arranged to rotate in only a single direction while at least one of the multiple spools is arranged to rotate in the single direction and an opposite direction.

In one aspect of the invention, the spools are linked to at least one counterweight.

In one aspect of the invention, the cable exercise machine may further include a counter in communication with the sensor and arranged to track a number of rotations of the flywheel.

In one aspect of the invention, the counter is arranged to provide the number as input to an energy tracker.

In one aspect of the invention, a cable exercise machine may include a first pull cable, a second pull cable, a third pull cable, and a fourth pull cable incorporated into a tower.

In one aspect of the invention, the cable exercise machine may further include that a first handle end of the first pull cable is routed to an upper right location of the tower, a second handle end of the second pull cable is routed to an upper left location of the tower, a third handle end of the third pull cable is routed to a lower right location of the tower, and a fourth handle end of the fourth pull cable is routed to a lower left location of the tower.

In one aspect of the invention, each of the first pull cable, the second pull cable, the third pull cable, and the fourth pull cable are connected to a resistance mechanism.

In one aspect of the invention, the resistance mechanism comprises a flywheel and a magnetic unit arranged to resist movement of the flywheel.

In one aspect of the invention, the flywheel is positioned between the upper right location, the upper left location, the lower right location, and the lower left location.

In one aspect of the invention, the flywheel is attached to a central shaft about which the flywheel is arranged to rotate and the central shaft supports multiple cable spools.

In one aspect of the invention, the multiple cable spools are attached to at least one of the first pull cable, the second pull cable, the third pull cable, and the fourth pull cable.

In one aspect of the invention, the flywheel is arranged to rotate in only a single direction while at least one of the multiple spools is arranged to rotate in the single direction and an opposite direction.

In one aspect of the invention, the spools are linked to at least one counterweight.

In one aspect of the invention, the cable exercise machine may further include a sensor is arranged to collect information about a position of the flywheel.

In one aspect of the invention, the cable exercise machine may further include a counter is in communication with the sensor and arranged to track a number of rotations of the flywheel.

In one aspect of the invention, the counter is arranged to provide the number as input to an energy tracker.

In one aspect of the invention, the energy tracker is arranged to receive as input a level of magnetic resistance exerted on the flywheel with the magnetic unit.

Any of the aspects of the invention detailed above may be combined with any other aspect of the invention detailed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate various embodiments of the present apparatus and are a part of the specification. The illustrated embodiments are merely examples of the present apparatus and do not limit the scope thereof.

FIG. **1** illustrates a front perspective view of an example of a cable exercise machine in accordance with the present disclosure.

FIG. **2** illustrates a front perspective view of the cable exercise machine of FIG. **1** with an outside cover removed.

FIG. **3** illustrates a front view of the cable exercise machine of FIG. **1** with an outside cover removed.

FIG. **4** illustrates a back view of the cable exercise machine of FIG. **1** with an outside cover removed.

FIG. **5** illustrates a side view of the cable exercise machine of FIG. **1** with an outside cover removed.

FIG. **6** illustrates a cross sectional view of a resistance mechanism of the cable exercise machine of FIG. **1**.

FIG. **7** illustrates a perspective view of an example of a tracking system of a cable exercise machine in accordance with the present disclosure.

FIG. **8** illustrates a block diagram of an example of a display of a cable exercise machine in accordance with the present disclosure.

Throughout the drawings, identical reference numbers designate similar, but not necessarily identical, elements.

DETAILED DESCRIPTION

Those who exercise often desire to know the amount of calories that they burn during their workouts. This information allows them to track their progress and achieve health related goals. Calories are burned during anaerobic exercises, such as those types of exercises that are performed on a cable exercise machine. The amount of calories that are burned using a cable exercise machine depends on the number of repetitions that the cable is pulled, the distance that the cable is moved during each pull, and the amount of resistance associated with each pull.

Generally, cable exercise machines provide resistance to the movement of the cable with a set of weighted plates. Often, these weighted plates are arranged in a stack with an ability to selectively connect a subset of the weighted plates to an attachment of the cable. This can be done by inserting

a removable pin within a plate slot of at least one of the weighted plates such that the pin is also inserted into an attachment slot of the cable. With this arrangement, when the user pulls the cable, the weighted plate will move with the cable. Also, any plates stacked over the moving plate will move with the cable as well. However, this type of cable exercise machine does not include a mechanism that assists the user in tracking the amount of calories burned during the workout.

The principles described in the present disclosure include a cable exercise machine that incorporates a sensor that tracks the position of a flywheel. The flywheel is incorporated into a magnetic resistance mechanism that applies a load of resistance to the movement of the pull cable. As the flywheel rotates, the sensor tracks the rotation of the flywheel. In some embodiments, the sensor causes a counter to be incremented up one for each rotation of the flywheel. In other embodiments, the sensor can track partial revolutions of the flywheel.

The level of resistance applied by the magnetic resistance mechanism can be controlled electronically. For example, an electrical input into an electromagnetic unit can produce an output of resistance that can resist the movement of the cable. In other examples, an adjustable distance between a magnetic unit and the flywheel can also change the amount of resistance that is applied to the movement of the cable. The inputs or outputs of these and other types of adjustable resistance mechanisms can be tracked and stored.

The tracked level of resistance can be sent to an energy tracker. Also, the sensor that tracks the position of the flywheel can also send position information to the energy tracker as an input. The energy tracker can determine the amount of calories (or other energy units) burned during each pull and/or collectively during the course of the entire workout based on the inputs about the flywheel position and the resistance level.

The principles described herein also include a unique example of a flywheel arrangement where a single flywheel is arranged to resist the movement of four different resistance cables. In some examples, the flywheel is attached to a central shaft with multiple spools coaxially mounted around the central shaft. The spools can contain attachments to at least one of the cables. As one of the pull cables is moved in a first direction, the spools are rotated in a first direction. The torque generated by rotating the spools is transferred to the flywheel, and the flywheel will rotate in the first direction with the spools. However, when the pull cable is returned, the force that caused the spools to rotate in the first direction ceases. At least one counterweight is connected to the flywheel through a counterweight cable. In the absence of the force imposed on the pull cable, the counterweights cause the spools to rotate back in the opposite direction to their original orientation before the pull cable force was imposed. However, the arrangement between the flywheel, shaft, and spools does not transfer the torque generated in the second direction to the flywheel. As a result, the orientation of the flywheel does not change as the counterweights pull the spools back. As the spools return to their original orientation in the opposite direction, the pull cables are rewound around the spools, which returns the handles connected to the pull cable back to their original locations as well.

Thus, in this example, the flywheel rotates in a single direction regardless of the direction that the pull cable is moving. Further, in this example, the flywheel is just rotating when a pull force is exerted by the user. Thus, the position of the flywheel represents just work done as part of the workout. In other words, the return movement of the cable does not affect the calorie count. Further, the calorie counting calculations of the cable exercise machine are simplified because the sensor is insulated from at least the return forces that may skew the calorie counting calculations. Consequently, the tracked calories represent just those calories that are consumed during the course of the workout.

With reference to this specification, terms such as "upper," "lower," and similar terms that are used with reference to components of the cable exercise machine are intended to describe relative relationships between the components being described. Such terms generally depict the relationship between such components when the cable exercise machine is standing in the intended upright position for proper use. For example, the term "lower" may refer to those components of the cable exercise machine that are located relatively closer to the base of the cable exercise machine than another component when the cable exercise machine is in the upright position. Likewise, the term "upper" may refer to those components of the cable exercise machine that are located relatively farther away from the base of the cable exercise machine when in the upright position. Such components that are described with "upper," "lower," or similar terms do not lose their relative relationships just because the cable exercise machine is temporarily on one of its sides for shipping, storage, or during manufacturing.

Particularly, with reference to the figures, FIGS. **1-5** depict a cable exercise machine **10**. FIG. **1** depicts the cable exercise machine **10** with an outer covering **12** about a tower **14** that supports the cables while FIGS. **2-5** depict different views of the cable exercise machine **10** without the outer covering **12**. In the example of FIGS. **1-5**, a resistance mechanism, such as a flywheel assembly **16**, is positioned in the middle of the tower **14**. The flywheel assembly **16** includes a flywheel **17**, a spool subassembly **18**, and a central shaft **19**. The flywheel assembly **16** is connected to multiple cables through a spool subassembly **18**. The cables are routed through multiple locations within the tower **14** with an arrangement of pulleys that direct the movement of the cables, a first counterweight **20**, a second counterweight **22**, and the flywheel assembly **16**. The first and second counterweights **20**, **22** are attached to a first counterweight guide **21** and a second counterweight guide **23** respectively. These guides **21**, **23** guide the movement of the counterweights **20**, **22** as they move with the rotation of the spool subassembly **18**.

At least some of the cables have a handle end **24** that is equipped with a handle connector **26** that is configured to secure a handle **28** for use in pulling the cables. The pulleys route the handle ends **24** of a first cable **30** to an upper right location **32** of the tower **14**, a second cable **34** to an upper left location **36** of the tower **14**, a third cable **38** to a lower right location **40** of the tower **14**, and a fourth cable **42** to a lower left location **44** of the tower **14**. Each of these cables **30**, **34**, **38**, **42** may be pulled to rotate the flywheel **17**.

The handle connectors **26** may be any appropriate type of connector for connecting a handle **28** to a cable. In some examples, at least one of the handle connectors **26** includes a loop to which a handle **28** can be connected. Such a loop may be made of a metal, rope, strap, another type of material, or combinations thereof. In some examples, the loop is spring loaded. In yet other examples, a loop is formed out of the cable material which serves as the handle **28**. The handle **28** may be a replaceable handle so that the user can change the type of grip or move the handle **28** to a different handle connector **26**.

The user can pull any combination of the cables **30**, **34**, **38**, **42** as desired. For example, the user may use the first and second cables **30**, **34** as a pair for exercises that involve muscle groups that produce downward motions. In other examples, the user may use the third and fourth cables **38**, **42** as a pair for exercises that involve muscle groups that produce upwards motions. Further, the user may use the first and third cables **30**, **38** as a pair. Likewise, the user may use the second and fourth cables **34**, **42** as a pair. In general, the user may combine any two of the cables to use as a pair to execute a workout as desired. Also, the user may use just a single cable as desired to execute a workout.

In some embodiments, a stopper **48** is attached to the handle ends **24** of the cables **30**, **34**, **38**, **42**. The stopper **48** can include a large enough cross sectional thickness to stop the handle end **24** from being pulled into a pulley, an opening in the outer covering, or another feature of the cable exercise machine **10** that directs the movement of the cables.

Additionally, the precise location to where the cables **30**, **34**, **38**, **42** are routed may be adjusted. For example, a guide bar **50** may be positioned on the cable exercise machine **10** that allows a pulley supporting the handle end **24** to move along the guide bar's length. Such adjustments may be made to customize the workout for the individual user's height and/or desired target muscle group.

Within the tower **14**, the pull cables **30**, **34**, **38**, **42** may be routed in any appropriate manner such that a pull force on one of the pull cables **30**, **34**, **38**, **42** causes the rotation of the flywheel **17**. For example, each of the pull cables **30**, **34**, **38**, **42** may have an end attached directly to the spool subassembly **18**. In other examples, each of the pull cables **30**, **34**, **38**, **42** may have an end attached directly to an intermediate component that attaches to the spool subassembly **18**. The movement of the pull cables **30**, **34**, **38**, **42** in a first pulling direction may cause the spool subassembly **18** to rotate in a first direction about the central shaft **19**. Further, counterweights **20**, **22** may be in communication with the spool subassembly **18** and arranged to rotate the spool subassembly **18** in a second returning direction. Further, the pull cables **30**, **34**, **38**, **42** may be routed with a single pulley or with multiple pulleys. In some examples, multiple pulleys are used to distribute the load to more than one location on the tower to provide support for the forces generated by a user pulling the pull cables **30**, **34**, **38**, **42** against a high resistance. Further, at least one of the pulleys incorporated within the tower may be a tensioner pulley that is intended to reduce the slack in the cables so that the resistance felt by the user is consistent throughout the pull.

A first cross bar **52** and a second cross bar **54** may collectively span from a first side **56** to a second side **58** of the tower **14**. The cross bars **52**, **54** collectively support an assembly member **60** that is oriented in a transverse orientation to the cross bars **52**, **54**. The central shaft **19** is inserted into an opening of the assembly member **60** and supports the flywheel assembly **16**.

The flywheel assembly **16** includes an arm **62** that is pivotally coupled to a fixture **64** connected to the first cross bar **52**. The arm **62** contains at least one magnetic unit **63** arranged to provide a desired magnetic flux. As the arm **62** is rotated to or away from the proximity of the flywheel **17**, the magnetic flux through which the flywheel **17** rotates changes, thereby altering the amount of rotational resistance experienced by the flywheel **17**.

The flywheel **17** may be constructed of multiple parts. For example, the flywheel **17** may include a magnetically conductive rim **66**. In other embodiments, the flywheel **17** includes another type of magnetically conductive component that interacts with the magnetic flux imparted by the arm **62**. As the magnetic flux increases, more energy is required to rotate the flywheel **17**. Thus, a user must impart a greater amount of energy as he or she pulls on the pull cable to rotate the flywheel **17**. As a result of the increased resistance, the user will consume more calories. Likewise, as the magnetic flux decreases, less energy is required to rotate the flywheel **17**. Thus, a user can impart a lower amount of energy as he or she pulls on the pull cable to rotate the flywheel **17**.

While this example has been described with specific reference to an arm **62** producing a magnetic flux that pivots to and away from the flywheel **17** to achieve a desired amount of resistance to rotation of the flywheel **17**, any appropriate mechanism for applying a resistance to the rotation of the flywheel **17** may be used in accordance with the principles described herein. For example, the arm **62** may remain at a fixed distance from the flywheel **17**. In such an example, the magnetic flux may be altered by providing a greater electrical input to achieve a greater magnetic output. Further, in lieu of pivoting the arm **62** to and away from the flywheel **17**, a magnetic unit **63** may be moved towards or away from the flywheel **17** with a linear actuator or another type of actuator.

The cable exercise machine **10** may further include a control panel **68** which may be incorporated into the outer covering **12** or some other convenient location. The control panel **68** may include various input devices (e.g., buttons, switches, dials, etc.) and output devices (e.g., LED lights, displays, alarms, etc.). The control panel **68** may further include connections for communication with other devices. Such input devices may be used to instruct the flywheel assembly to change a level of magnetic resistance, track calories, set a timer, play music, play an audiovisual program, provide other forms of entertainment, execute a pre-programmed workout, perform another type of task, or combinations thereof. A display can indicate the feedback to the user about his or her performance, the resistance level at which the resistance mechanism is set, the number of calories consumed during the workout, other types of information, or combinations thereof.

FIG. **6** illustrates a cross sectional view of a resistance mechanism of the cable exercise machine of FIG. **1**. In this example, the central shaft **19** is rigidly connected to a body **74** of the flywheel **17**. A bearing subassembly **76** is disposed around the central shaft **19** and is positioned to transfer a rotational load imparted in a first direction to the flywheel **17**. Concentric to the central shaft **19** and the bearing subassembly **76** is the spool subassembly **18** which is connected to at least one of the pull cables **30**, **34**, **38**, **42**.

In a retracted position, a portion of a pull cable connected to the spool subassembly **18** is wound in slots **78** formed in the spool subassembly **18**. As the pull cable is pulled by the user during a workout, the pull cable exerts a force tangential in the first direction to the spool subassembly **18** and rotates the spool subassembly **18** in the first direction as the pull cable unwinds. In some examples, a counterweight cable that is also connected to the spool subassembly **18** winds up in the slots **78** of the spool subassembly **18**. This motion shortens the available amount of the counterweight cable and causes at least one of the counterweights **20**, **22** to be raised to a higher elevation. When the force on the pull cable ceases, the gravity on the counterweight pulls the counterweight back to its original position, which imposes another tangential force in a second direction on the spool subassembly **18** causing it to unwind the counterweight cable in the second direction. The unwinding motion of the

counterweight cable causes the pull cable to rewind back into the slots **78** of the spool subassembly **18**. This motion pulls the pull cable back into the tower **14** until the stoppers **48** attached to the handle ends **24** of the pull cables prevent the pull cables from moving.

As the spool subassembly **18** rotates in the first direction, the bearing subassembly **76** is positioned to transfer the rotational load from the spool subassembly **18** to the central shaft **19** which transfers the rotational load to the flywheel body **74**. As a result, the flywheel **17** rotates with the spool subassembly **18** in the first direction as the user pulls on the pull cables. However, as the spool subassembly **18** rotates in the second direction imposed by the counterweights **20**, **22** returning to their original positions, the bearing subassembly **76** is not positioned to transfer the rotational load from the spool subassembly **18** to the central shaft **19**. Thus, no rotational load is transferred to the flywheel body **74**. As a result, the flywheel **17** remains in its rotational orientation as the spool subassembly **18** rotates in the second direction. Consequently, the flywheel **17** moves in just the first direction.

While this example has been described with specific reference to the flywheel **17** rotating in just a single direction, in other examples the flywheel is arranged to rotate in multiple directions. Further, while this example has been described with reference to a specific arrangement of cables, pulleys, and counterweights, these components of the cable exercise machine **10** may be arranged in other configurations.

A sensor **80** can be arranged to track the rotational position of the flywheel **17**. As the flywheel **17** rotates from the movement of the pull cables, the sensor **80** can track the revolutions that the flywheel rotates. In some examples, the sensor **80** may track half revolutions, quarter revolutions, other fractional revolutions, or combinations thereof.

The sensor **80** may be any appropriate type of sensor that can determine the rotational position of the flywheel **17**. Further, the sensor **80** may be configured to determine the flywheel's position based on features incorporated into the flywheel body **74**, the magnetically conductive rim **66**, or the central shaft **19** of the flywheel **17**. For example, the sensor **80** may be a mechanical rotary sensor, an optical rotary sensor, a magnetic rotary sensor, a capacitive rotary sensor, a geared multi-turn sensor, an incremental rotary sensor, another type of sensor, or combinations thereof. In some examples, a visual code may be depicted on the flywheel body **74**, and the sensor **80** may read the position of the visual code to determine the number of revolutions or partial revolutions. In other examples, the flywheel body **74** includes at least one feature that is counted as the features rotate with the flywheel body **74**. In some examples, a feature is a magnetic feature, a recess, a protrusion, an optical feature, another type of feature, or combinations thereof.

The sensor **80** can feed the number of revolutions and/or partial revolutions to a processor as an input. The processor can also receive as an input the level of resistance that was applied to the flywheel **17** when the revolutions occurred. As a result, the processor can cause the amount of energy or number of calories consumed to be determined. In some examples, other information, other than just the calorie count, is determined using the revolution count. For example, the processor may also determine the expected remaining life of the cable exercise machine **10** based on use. Such a number may be based, at least in part, on the number of flywheel revolutions. Further, the processor may also use the revolution count to track when maintenance should occur on the machine, and send a message to the user or another person indicating that maintenance should be performed on the machine based on usage.

In some examples, the sensor **80** is accompanied with an accelerometer. The combination of the inputs from the accelerometer and the sensor can at least aid the processor in determining the force exerted by the user during each pull. The processor may also track the force per pull, the average force over the course of the workout, the trends of force over the course of the workout, and so forth. For example, the processor may cause a graph of force per pull to be displayed to the user. In such a graph, the amount of force exerted by the user at the beginning of the workout versus the end of the workout may be depicted. Such information may be useful to the user and/or a trainer in customizing a workout for the user.

The number of calories per pull may be presented to the user in a display of the cable exercise machine **10**. In some examples, the calories for an entire workout are tracked and presented to the user. In some examples, the calorie count is presented to the user through the display, through an audible mechanism, through a tactile mechanism, through another type of sensory mechanism, or combinations thereof.

FIG. **7** illustrates a perspective view of a tracking system **82** of a cable exercise machine **10** in accordance with the present disclosure. The tracking system **82** may include a combination of hardware and programmed instructions for executing the functions of the tracking system **82**. In this example, the tracking system **82** includes processing resources **84** that are in communication with memory resources **86**. Processing resources **84** include at least one processor and other resources used to process programmed instructions. The memory resources **86** represent generally any memory capable of storing data such as programmed instructions or data structures used by the tracking system **82**. The programmed instructions shown stored in the memory resources **86** include a counter **88** and a calorie tracker **90**.

The memory resources **86** include a computer readable storage medium that contains computer readable program code to cause tasks to be executed by the processing resources **84**. The computer readable storage medium may be tangible and/or non-transitory storage medium. The computer readable storage medium may be any appropriate storage medium that is not a transmission storage medium. A non-exhaustive list of computer readable storage medium types includes non-volatile memory, volatile memory, random access memory, write only memory, flash memory, electrically erasable program read only memory, magnetic storage media, other types of memory, or combinations thereof.

The counter **88** represents programmed instructions that, when executed, cause the processing resources **84** to count the number of revolutions and/or partial revolutions made by the flywheel **17**. The calorie tracker **90** represents programmed instructions that, when executed, cause the processing resources **84** to track the number of calories burned by the user during this workout. The calorie tracker **90** takes inputs from at least the sensor **80** and the resistance mechanism to calculate the number of calories burned.

Further, the memory resources **86** may be part of an installation package. In response to installing the installation package, the programmed instructions of the memory resources **86** may be downloaded from the installation package's source, such as a portable medium, a server, a remote network location, another location, or combinations thereof. Portable memory media that are compatible with the

principles described herein include DVDs, CDs, flash memory, portable disks, magnetic disks, optical disks, other forms of portable memory, or combinations thereof. In other examples, the program instructions are already installed. Here, the memory resources can include integrated memory such as a hard drive, a solid state hard drive, or the like.

In some examples, the processing resources **84** and the memory resources **86** are located within the same physical component, such as the cable exercise machine **10** or a remote component in connection with the cable exercise machine **10**. The memory resources **86** may be part of the cable exercise machine's main memory, caches, registers, non-volatile memory, or elsewhere in the physical component's memory hierarchy. Alternatively, the memory resources **86** may be in communication with the processing resources **84** over a network. Further, the data structures, such as the libraries, calorie charts, histories, and so forth may be accessed from a remote location over a network connection while the programmed instructions are located locally. Thus, information from the tracking system **82** may be accessible on a user device, on a server, on a collection of servers, or combinations thereof.

FIG. **8** illustrates a block diagram of a display **92** of a cable exercise machine **10** in accordance with the present disclosure. In this example, the display **92** includes a resistance level indicator **94**, a pull count indicator **96**, and a calorie indicator **98**. The resistance level indicator **94** may be used to display the current resistance setting of the cable exercise machine **10**.

The pull count indicator **96** may track the number of pulls that have been executed by the user. Such a number may track the time periods where the flywheel **17** is rotating, the number of periods when the flywheel **17** is not rotating, the time periods where the spool subassembly **18** is rotating in the first direction, the time periods where the spool subassembly **18** is rotating in the second direction, the movement of the counterweights **20**, **22**, another movement, or combinations thereof. In some examples, the cable exercise machine **10** has an ability to determine whether a pull is a partial pull or a full length pull. In such examples, the pull count indicator **96** may depict the total pulls and partial pulls.

The calorie indicator **98** may depict the current calculation of consumed calories in the workout. In some examples, the calorie count reflects just the input from the sensor **80**. In other examples, the calorie count reflects the input from the flywheel assembly **16** and the sensor **80**. In other examples, inputs from an accelerometer are input into the flywheel assembly **16**, a pedometer worn by the user, another exercise machine (i.e. a treadmill or elliptical with calorie tracking capabilities), another device, or combinations thereof are also reflected in the calorie indicator **98**.

While the above examples have been described with reference to a specific cable exercise machine with pulleys and cables for directing the rotation of the flywheel **17** and pull cables **30**, **34**, **38**, **42**, any appropriate type of cable pull machine may be used. For example, the cable exercise machine may use bearing surfaces or sprockets to guide the cables. In other examples, the cables may be partially made of chains, ropes, wires, metal cables, other types of cables, or combinations thereof. Further, the cables may be routed in different directions than depicted above.

INDUSTRIAL APPLICABILITY

In general, the invention disclosed herein may provide a user with the advantage of an intuitive energy tracking device incorporated into a cable exercise machine. The user can adjust his or her workout based on the number of calories consumed. Further, the user may use the calorie count to adjust his or her diet throughout the day. The cable exercise machine described above may also have the ability to track other information besides the calorie count, such as a force exerted per pull as well as track a maintenance schedule based on the flywheel's revolution count.

The level of resistance applied by the magnetic resistance mechanism of the present exemplary system can be finely controlled via electronic inputs. The inputs or outputs of these and other types of adjustable resistance mechanisms can be tracked and stored. The tracked level of resistance can then be sent to a calorie tracker. The calorie tracker can determine the amount of calories burned during each individual pull and/or a group of pulls collectively during the course of the entire workout based on the inputs about the flywheel position and the resistance level. This may provide a user with an accurate representation of the work performed on the cable exercise machine.

The present system may also provide a precise calculation of work performed during the workout, while providing the user the flexibility of using multiple resistance cables. The unique flywheel arrangement allows for the use of a single flywheel to resist the movement of multiple different resistance cables. According to the present configuration, the flywheel rotates in a single direction regardless of the direction that the pull cable is moving. Further, in this example, the flywheel is just rotating when a pull force is exerted by the user, thus the position of the flywheel represents just the work done as part of the workout. Further, the calorie counting calculations of the cable exercise machine are simplified because the sensor is insulated from at least the pull cable's return forces that may skew the calorie counting calculations. Consequently, the tracked calories can represent just those calories that are consumed during the course of the workout.

Additionally, the present exemplary system also determines the angular position of the flywheel during operation. Measuring the angular position of the flywheel provides advantages over merely measuring forces applied directly to the flywheel, such as torque or magnetic resistance. For example, angular position changes may be implemented in the calculation process. Further, the angular displacement of the flywheel may reflect the total interaction between all of the components of the flywheel assembly, which can provide a more accurate understanding of when the cable exercise machine ought to be flagged for routine service.

Such a cable exercise machine may include a tower that has the ability to position the ends of the pull cables at a location above the user's head. Further, the user has an ability to adjust the position of the cable ends along a height of the cable exercise machine so that the user can refine the muscle groups of interest. In the examples of the exercise machine disclosed above, the user has four pull cables to which the user can attach a handle. Thus, the user can work muscle groups that involve pulling a low positioned cable with a first hand while pulling a relatively higher positioned cable with a second hand. The pull cable ends can be adjusted to multiple positions when the magnetic flywheel is positioned in the middle of the cable exercise machine. This central location allows for the pull cables to be attached to the spool subassembly from a variety of angles.

The invention claimed is:

1. A cable exercise machine comprising:

a tower;

a first vertical guide incorporated into the tower;

a first pull cable routed through a first pulley, the first pulley movable along a length of the first vertical guide;

a second vertical guide incorporated into the tower;

a second pull cable routed through a second pulley, the second pulley movable along a length of the second vertical guide;

an electromagnetic unit linked to the first pull cable and to the second pull cable, the electromagnetic unit configured to apply one or more levels of resistance to a user pulling on the first pull cable and/or the second pull cable; and

a control panel configured to:

adjust the level of resistance applied by the electromagnetic unit to the user pulling on the first pull cable and/or the second pull cable, and

present the adjusted level of resistance to the user.

2. The cable exercise machine of claim **1**, wherein:

the first pull cable includes a first handle end equipped with a first handle connector that includes a first spring-loaded loop configured to have a first handle connected thereto; and

the second pull cable includes a second handle end equipped with a second handle connector that includes a second spring-loaded loop configured to have a second handle connected thereto.

3. The cable exercise machine of claim **2**, wherein:

the first pull cable includes a first stopper attached to the first handle end with a cross sectional thickness that is large enough to stop the first handle end from being pulled into an opening in a first outer covering; and

the second pull cable includes a second stopper attached to the second handle end with a cross-sectional thickness that is large enough to stop the second handle end from being pulled into an opening in a second outer covering.

4. The cable exercise machine of claim **1**, wherein:

the first pulley is movable along the length of the first vertical guide to customize a workout for a height of the user; and

the second pulley is movable along the length of the second vertical guide to customize the workout for the height of the user.

5. The cable exercise machine of claim **1**, wherein:

the first pulley is movable along the length of the first vertical guide to customize a workout for a desired target muscle group of the user; and

the second pulley is movable along the length of the second vertical guide to customize the workout for the desired target muscle group of the user.

6. The cable exercise machine of claim **1**, wherein:

the first vertical guide extends from an upper left location of the tower to a lower left location of the tower; and

the second vertical guide extends from an upper right location of the tower to a lower right location of the tower.

7. The cable exercise machine of claim **6**, wherein:

the first pulley is further rotatable from side to side on the first vertical guide; and

the second pulley is further rotatable from side to side on the second vertical guide.

8. The cable exercise machine of claim **6**, wherein the first pulley is movable to the lower left location while the second pulley is movable to the upper right location.

9. The cable exercise machine of claim **1**, wherein the control panel is incorporated into an outer covering of the tower.

10. The cable exercise machine of claim **1**, wherein:

the first vertical guide comprises a first vertical guide bar; and

the second vertical guide comprises a second vertical guide bar.

11. A cable exercise machine comprising:

a tower;

a first pull cable routed through a first pulley supported by the tower;

a second pull cable routed through a second pulley supported by the tower;

an electromagnetic unit linked to the first pull cable and to the second pull cable, the electromagnetic unit configured to apply one or more levels of resistance to a user pulling on the first pull cable and/or the second pull cable; and

a control panel configured to:

receive input from the user to adjust the level of resistance applied by the electromagnetic unit to the user pulling on the first pull cable and/or the second pull cable,

present the adjusted level of resistance to the user; and

display a force exerted by the user during each pull of the first pull cable and/or the second pull cable over the course of a workout.

12. The cable exercise machine of claim **11**, wherein the control panel is further configured to display a trend of the force exerted by the user during each pull of the first pull cable and/or the second pull cable over the course of the workout.

13. The cable exercise machine of claim **11**, wherein the control panel is further configured to display a graph of the force exerted by the user during each pull of the first pull cable and/or the second pull cable over the course of the workout.

14. The cable exercise machine of claim **13**, wherein the graph depicts the force exerted by the user at the beginning of the workout versus the end of the workout.

15. A cable exercise machine comprising:

a tower;

a first pull cable routed through a first pulley supported by the tower;

a second pull cable routed through a second pulley supported by the tower;

an electromagnetic unit linked to the first pull cable and to the second pull cable, the electromagnetic unit configured to apply one or more levels of resistance to a user pulling on the first pull cable and/or the second pull cable; and

a control panel configured to:

receive input from the user to adjust the level of resistance applied by the electromagnetic unit to the user pulling on the first pull cable and/or the second pull cable,

present the adjusted level of resistance to the user,

receive input from the user to play an audiovisual program, and

play the audiovisual program for the user.

16. The cable exercise machine of claim **15**, wherein:

the input from the user to adjust the level of resistance is received via a dial; and

the adjusted level of resistance to the user is presented via a display.

17. The cable exercise machine of claim **15**, wherein the control panel is further configured to:

receive input from the user to play music; and

play the music for the user.

18. The cable exercise machine of claim **15**, wherein the control panel is further configured to:

receive input from the user to execute a pre-programmed workout; and

execute the pre-programmed workout for the user.

19. The cable exercise machine of claim **15**, wherein the control panel is further configured to display a count of a number of times that the user pulled on the first pull cable and/or the second pull cable over the course of a workout.

20. The cable exercise machine of claim **15**, wherein the control panel is further configured to:

determine whether a pull by the user on the first pull cable and/or the second pull cable is a partial pull or a full-length pull; and

display a count that includes a number of times that the user performed a full-length pull, and excludes a number of times that the user performed a partial pull, on the first pull cable and/or the second pull cable over the course of a workout.

* * * * *

EXHIBIT C

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David R. Wright
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August 21, 2020

Via FedEx

TONAL SYSTEMS, INC.
c/o Aly Orade and Michael Tamaru
325 Vermont Street
San Francisco, California 94103

Re: ICON Health & Fitness, Inc.'s Patents

Messrs. Orade and Tamaru:

This firm represents ICON Health & Fitness, Inc. in connection with the enforcement of its intellectual property rights. We write to inform you of intellectual property concerns that have come to ICON's attention, including patent infringement.

As you may be aware, ICON is a world leader and innovator in the development and manufacture of exercise equipment, including its award-winning NordicTrack Fusion CST cable machines. ICON has made significant investments in its innovations, in particular with regards to its NordicTrack Fusion line of strength-training machines, and protects those investments by securing intellectual property rights, including its ownership rights in U.S. Patent No. 10,709,925 ("'925 patent") and U.S. Patent No. 10,758,767 ("'767 patent").[1] ICON has heavily invested in the development, production, promotion, and sale of products covered by or related to the inventions in these patents, including in connection with its NordicTrack Fusion cable machines.[2]

It has recently come to our attention that Tonal Systems, Inc. is manufacturing, using, selling, offering for sale, or importing into the United States products which practice one or more claims of the '925 and '767 patents. Below is a brief overview of an exemplary claim of these patents and how Tonal's device practices those claims.

The '925 Patent

Tonal's strength-training cable machines practice at least claim 1 of the '925 patent. The Tonal device incorporates (1) a strength training apparatus comprising a tower and a first and second arm each pivotally coupled with the tower and each arm being configured to be selectively positionable independent of each other at multiple angles relative to each other; (2) a first and second pulley coupled to the ends of the first and second arms respectively, and first and second cables extending through the arms and pulleys; (3) a magnetic mechanism coupled to the cables and configured to

[1] Issuing September 1, 2020.
[2] *See* https://patents.iconfitness.com/patent/

provide multiple levels of resistance to a user pulling on the cables; and (4) a control panel that can control, display, and set the levels of resistance.

The '767 Patent

Tonal's strength-training cable machines practice at least claim 1 of the '767 patent. The Tonal device incorporates (1) a cable exercise machine comprising a tower and a first and second guide bar incorporated into the tower; (2) pull cables routed through a pulleys with pulleys that are movable along a length of the guide bars; (3) an electromagnetic unit linked to the pull cables that is configured to provide one or more levels of resistance to a user pulling on the cables; and (4) a control panel that can adjust and present the level of resistance.

ICON desires first to seek a resolution to this patent concern in good faith without litigation before it seeks any sort of court enforcement of its patents. Please contact us within 14 days of this letter if Tonal is willing to meet and discuss the issues raised in this letter.

ICON looks forward to your response. Please feel free to contact me or my Maschoff Brennan colleague Tyson Hottinger if you have any questions regarding these matters.

Sincerely,

MASCHOFF BRENNAN

David R. Wright